

# Orthopaedic Physical Examination of the Shoulder

## Look

1. Exposure
2. **Inspect** from front, back, side, for asymmetry, deformities, scars, sinuses, muscle wasting (esp deltoid, supraspinatus and infraspinatus). Also inspect axilla for scars and sinuses.

## Feel

3. Ask about pain.
4. **Palpate:** sternoclavicular joint, clavicle, acromioclavicular joint, greater tuberosity of humerus, long head of biceps - looking for tenderness, deformity, abnormal joint mobility

## Move

5. **Active:** Flexion, extension, abduction, adduction, external rotation, functional internal rotation. Grade motor power
6. **Passive:** If active movement abnormal. Equal restriction of active and passive movement implies frozen shoulder. Failure of active abduction but no problem with passive abduction implies rotator cuff tear.
7. **Supraspinatus:** abduct 90deg, forward flexion 30deg, and internal rotate (“thumbs down”), resist downwards force
8. **Infraspinatus:** elbows by side and attempt to externally rotate, resist internal rotation
9. **Subscapularis:** press down on belly while keeping elbows forward.

## Special tests

10. **Anterior apprehension test:** If you suspect shoulder instability, esp young patients - Passively abduct arm to 90deg and externally rotate. Apply pressure anteriorly onto humeral head, look for apprehension or guarding.
11. **Hawkin’s (impingement) test:** For rotator cuff impingement, esp older patients. Passively flex arm to 90deg, flex elbow to 90deg, internally rotate arm while looking for pain.
12. **Neer’s test:** For rotator cuff impingement, esp older patients. Stabilize shoulder with one hand, internally rotate arm, passively flex to 90deg while looking for pain.
13. **Drop arm sign:** For rotator cuff tear
14. **Popeye sign:** Resisted elbow flexion - rupture of long head of biceps.

## Offer

15. Cervical spine
16. Neurological examination of upper limb
17. Vascular examination of upper limb

# Orthopaedic Physical Examination of the Elbow

## Look

1. Exposure
2. **Inspect** with elbow extended. Comment on carrying angle or cubitus varus / valgus.
3. **Inspect** with elbow flexed. Look at olecranon for deformities, lumps, bumps, gouty tophi.

## Feel

4. **Palpate:** lateral epicondyle, radial head, medial epicondyle, cubital tunnel (ulnar nerve), olecranon.

## Move

5. **Active:** Flexion, extension, pronation, supination (with elbows tucked against body).
6. Passive

## Special tests

7. **Provocative test for lateral epicondylitis (Tennis elbow):** Fully extend elbow, pronate forearm, actively extend wrist against resistance. This should increase pain at lateral epicondyle.
8. **Provocative test for medial epicondylitis (Golfer's elbow):** Fully extend elbow, supinate forearm, actively flex wrist against resistance. This should increase pain at medial epicondyle.

## Offer

9. Neurological examination of upper limb esp peripheral nerves
10. Vascular examination of upper limb

# Orthopaedic Physical Examination of the Hand

## Screening

### Look

1. Ask about pain and presenting complaint.
2. **Inspect** forearm pronated and supinated – for deformities, skin changes, wasting of muscles (forearm, thenar & hypothenar eminences, intrinsic muscles)
3. **Inspect** with wrist and fingers ex

### Move

4. Wrist and finger extension – for wrist drop and finger drop
5. Open and close hand – screen for median and ulnar nerve sign, trigger finger, joint pathology restricting range of motion
6. OK sign: in anterior interosseous nerve (median nerve branch) pathology, patient will make a triangle due to weakness of FDP and FPL

*Decide whether this is a nerve problem, deformity, or lump & bump then proceed to specific exam*

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## Nerve Palsies

### Radial nerve

- |            |   |
|------------|---|
| Inspection | <ul style="list-style-type: none"><li>• Wrist drop</li><li>• <b>Muscle wasting:</b> Extensors and triceps</li></ul>   |
| Motor      | <ul style="list-style-type: none"><li>• <b>Demonstration of function:</b><ul style="list-style-type: none"><li>- wrist extension (higher radial nerve palsy),</li><li>- MCPJ and thumb extension (pos interosseous nerve: EPL, ED)</li></ul></li></ul>                              |
| Sensory    | <ul style="list-style-type: none"><li>• <b>Sensory:</b> numbness on dorsal side of hand, base of thumb extending to 1<sup>st</sup> web space.</li><li>• <b>Tinel's test:</b> tap radial nerve along course up to spiral groove of humerus. Positive if shooting sensation</li></ul> |

## Median nerve (esp carpal tunnel)

- Inspection
- **Thenar eminence wasting**
- Motor
- **Demonstration of function:**
    - finger flexion
    - FDS (medial & ring finger): isolate finger, hold other fingers down
    - FDP (index & middle finger): isolate distal phalanx and flex
  - **Benediction sign:** weak flexion in radial 3 fingers
  - **O (ok) sign:** as above
  - [Carpel tunnel] check abduction (APB)
- Sensory
- Numbness in lateral 3.5 fingers on the palmar side.
    - If high medial nerve lesion, also numbness over wrist
    - Carpel tunnel: palmar cutaneous br arises early, hence preserved.
  - Carpel tunnel
    - a. **Tinel's test:** tap over carpel tunnel, positive if shooting sensation felt down median nerve distribution
    - b. **Compression test:** press over wrist for 1 min to elicit numbness
    - c. **Phalen's test:** keep wrist flexed for 1min to elicit numbness

## Ulnar nerve

- Inspection
- **Claw hand:** Hyperextension of MTP joint and flexion of IP joints of ring and little finger.
  - **Wasting:** hypothenar eminence, 1<sup>st</sup> dorsal interosseous muscle, guttering between fingers on dorsum
  - Look for valgus and varus deformities of UL
- Motor
- Function testing
    - Intrinsic finger abductors
    - Cross fingers
    - FDP of little and ring finger
  - **Froment's test** ("do not let me pull out paper"). If thumb flexes instead of adducts, positive for ulnar nerve dysfunction.
- Sensory
- **Sensory:** numbness in medial 1.5 fingers
  - **Tinel's test:** tap from distal to proximal, behind ulnar side of elbow
  - Check whether nerve subluxes: place finger behind ulnar nerve at elbow and flex elbow, feel for subluxation of nerve. Flex elbow for 1min and check for increased numbness

## Lumps & Bumps

1. Inspect palmar (volar) and dorsal surface - for asymmetry, swelling, posture
2. Location of lumps are key:
  - **Ganglion** (most common) – commonly in dorsal radial aspect of wrist, dorsum of DIPJ, volar radial aspect of wrist, volar aspect of distal thumb (A1 pulleys of fingers)
  - **Pigmented villonodular synovitis** (giant cell tumor of tendon sheath) - commonly finger joints, extensor and flexor tendons
3. Then examine size, shape, lobulation
4. Overlying skin
5. Tenderness
6. Consistency
  - Soft: lipoma, nerve tumors
  - Firm: cystic lump
  - Hard: bone, de quervain's tendosynovitis
7. Confirmation of fluid filled lump:
  - Fluctuance: hold lump with two fingers, press down on lump]
  - Compressible and disappears when pressed: vascular
8. Slip sign: lipoma
9. Transillumination
10. Attached structures:
  - Lump attached to skin with obvious punctum: sebaceous cyst
  - Lump attached to tendon (moves in longitudinal fashion along tendon when tendon moved, passively mobile perpendicular to tendon)
  - Lump in muscle (indistinct when muscle contracted)
  - Lump superficial to muscle (more distinct when muscle contacted)
11. Tinel's sign: tapping lump results in tingling sensation in area of sensory distribution suggests a nervous origin

## Hand joint pathology

### RA

1. Inspection: e.g. ulnar head prominence, ulnar deviation of MCPJ, volar subluxation, boutonniere or swan neck deformity of fingers
2. Full flexion of fingers to assess range of motion and subluxation of extensor tendons
3. Extension of fingers to assess for. tendon rupture, contracture, subluxation
4. Palpation: determine nature of lumps
  - **Piano key sign** (Caput ulnar syndrome): support distal radius and depress ulnar head. Ulnar head reduces and bounces back up when released.
5. Attempt to reduce any deviation and deformity etc
6. Functional assessment: e.g. fist, pinch, etc
7. Offer to examine rest of MSK (shoulder, hips, knees, C-spine)
8. Look for nerve pathologies: muscle wasting, nerve palsy patterns

### OA

1. Inspection: e.g. PIPJ Bouchard nodes, DIPJ Heberden's nodes, mallet deformity, swelling and subluxation of 1<sup>st</sup> carpometacarpal joint.
2. Grinding test for 1<sup>st</sup> carpometacarpal joint.
3. Examine range of motion: full flexion

### De Quervain's tendosynovitis

1. Swelling & pain of 1<sup>st</sup> dorsal compartment of wrist.
2. **Finkelstein's test**: ask patient to wrap fingers around thumb with ulnar deviation of wrist. Sharp pain in 1<sup>st</sup> dorsal compartment indicates De Quervain's tendosynovitis.

### Trigger digit

# Orthopaedic Physical Examination of the Hip

## Look

1. Exposure
2. **Inspect** standing patient from front, side, and back – for scars, deformities, and muscle wasting
3. **Gait** – look for antalgic gait, trendelenburg gait, short limb gait, etc
4. **Trendelenburg test.** Dipping of left hemipelvis indicates contralateral gluteal muscle weakness
5. Inspect supine patient.

## Feel

6. **Palpate bony landmarks** – ASIS, inguinal ligament, pubic tubercle, hip joint, gluteus medius, greater trochanter
7. **Limb length** measurement:
  - a. Apparent length : Measure xiphisternum to medial malleolus
  - b. True length : Square pelvis, measure ASIS to medial malleolus
  - c. Gallaezzi test if true length disparity: flex hip at 45 and hip at 90, look at knee from side to see if shortening is femoral or tibial.

## Move

8. **Thomas' test:** place hand behind lumbar spine, pull one knee towards chest to straighten out the lumbar spine. Observe if there is fixed flexion deformity of the contralateral hip
9. **Abduction & adduction:** place one hand on ASIS, abduct limb and measure angle once ASIS begins to move. Repeat for adduction.
10. **Rotation:** In extension, roll leg from side to side to demonstrate external and internal rotation. If in flexion, move foot inwards or outwards instead.

## Offer

11. Neurological exam
12. Vascular exam: peripheral pulses

# Orthopaedic Physical Examination of the Knee

## Look

1. Exposure
2. **Inspect** standing patient from front, side, and back – for scars, deformities, swelling / fulness, limb alignment and muscle wasting
3. **Gait** – look for antalgic gait
4. Thigh circumference measurement (10cm above knee) – for quadriceps wasting.

## Feel

5. Palpate for warmth, proximally to distally.
6. Testing for effusion: milk fluid from suprapatellar pouch and,
  - a. [Gross effusion] Patella ballotment test: press down on patella
  - b. [Moderate effusion] Cross fluctuance test: press medial aspect of knee and feel fluctuance on lateral aspect of knee
  - c. [Mild effusion] Bulge test: empty medial aspect, swipe lateral side and look for refilling of medial side.
7. Sublux patella medially to palpate medial facet, and laterally to palpate lateral facet.
8. Patellar grinding test: press down on patella and observe for tenderness
9. Patellar apprehension test: attempt to sublux the patella laterally and look for apprehension
10. Quadriceps tendon, patellar tendon, and tibial tuberosity for tenderness
11. Joint lines for tenderness
12. Collateral ligaments
  - a. Lateral – palpate upwards
  - b. Medial – palpate downwards

## Move

13. Active movements:
  - a. Extension: press down against bottom of bed – for extensor lag
  - b. Flexion: compare contralaterally
14. Passive movements:
  - a. Extension – differentiates fixed flexion deformity from extensor lag.
  - b. Flexion: compare contralaterally

## Special tests

15. **Varus & valgus stress tests:** in full extension and in 30deg flexion – Varus stress for lateral collateral ligament damage, valgus for medial collateral ligament.



16. **Drawer tests:** Flex knee 90deg, look for posterior sag. Apply posterior and then anterior directed force, comparing both sides. Positive anterior drawer test indicates ACL injury, positive posterior drawer test indicates PCL injury
17. Lachmann's test: Flex knee to 30deg. Stabilize femur and pull tibia forward. Indicates ACL injury
18. Pivot shift test: lift leg, extend and , internally rotate knee, apply valgus stress and flex knee. If a clunk is felt, test is positive indicating ACL injury
19. McMurray's test: fully flex knee, palpate joint line.
  - a. Medial meniscus: externally rotate knee, apply valgus force, gradually extend knee and assess for pain or clunk.
  - b. Lateral meniscus: internally rotate, apply varus stress, gradually extend knee and assess for pain or clunk.

# Orthopaedic Physical Examination of the Foot & Ankle

## Look

1. Exposure (from mid thigh, remove shoes).
2. **Inspect** with patient standing. Look at general state of lower limb, then forefoot, midfoot (arch: cavus, planus), hindfoot (tendo archilles, heels)
3. **Inspect** soles of feet for ulcerations, callosities.

## Feel (of ankle)

4. **Palpate** with patient supine or seated: posterior tibial tendon, medial malleolus, joint line, lateral malleolus, peroneal tendons (pos to lateral malleolus), and tendo archilles.

## Move

5. **Active:** Dorsiflexion, plantarflexion, supination (inversion), pronate (eversion). Compare both sides
6. **Passive:** isolate and test subtalar and midfoot joints.
  - a. Subtalar joints: Maximally dorsiflex ankle to lock talofibular joint, try inversion and eversion
  - b. Midfoot joints: immobilize hindfoot, test isolated movement

## Special tests

7. **Anterior drawer test:** For insufficiency / laxity of anterior talofibular ligament (ATFL). Stabilize tibia, keep ankle in 10deg plantarflexion, cup and pull heel forward. Compare with opposite side.
8. **Simmond's test:** Lie patient prone with foot overhanging examination couch. Squeeze soleus muscle, foot should plantarflex. If this does not occur, it suggests a tear in the tendo archilles

## Other

9. Vascular: dorsalis pedis, posterior tibial, capillary refill time.
10. Neurological: sup peroneal nerve (dorsum), deep peroneal nerve (1<sup>st</sup> webspace), saphenous nerve (medial border), sural nerve (lateral border), tibial nerve (sole).
11. Look at shoes for abnormal or asymmetric wear.

# Orthopaedic Physical Examination of the Lumbar Spine

## Look

1. **Gait:** watch for antalgic gait, broad based gait, high step gait.
2. **Inspect** with patient standing from back and side. Look for scoliosis – Are shoulders level? Are iliac crests level?

## Feel

3. Ask for tenderness
4. **Palpate** from C7 spinous process to L4 (between two iliac crests) and sacrum – for tenderness,
5. **Palpate** parasternal muscles (both sides simultaneously).

## Move

6. **Active movement:** Forward flexion (document distance of fingertips from ground, extension, lateral bending (R and L), rotation (stabilize iliac crests, ask patient to twist R/L)
7. **Schober's test** to quantify forward flexion. Take midpoint between two PSIS, then measure a point 10cm above and 5cm below. Ask patient to bend forward and measure excursion of tape. Normal is >5cm.

## Neuro

8. **Motor:** Check bilaterally with resistance and grade 0-5.
  - S1 – Plantarflexion of big toe (FHL) or ankle (gastrocnemius/soleus)
  - L5 – Dorsiflexion of big toe (EDL)
  - L4 – Dorsiflexion of ankle (tibialis anterior)
  - L3 – Extension of knee (quadriceps)
  - L2 – Hip flexion (iliopsoas)
9. **Sensory:** Light touch and pain. Grade 0 - 3+ (2 = normal)
  - L2 – Outer thigh
  - L3 – Outer knee
  - L4 – Medial side of leg and instep
  - L5 – Outer side of leg and dorsum of foot
  - S1 – Sole of foot
10. **Reflexes:** knee, ankle, plantars, clonus. Grade 0 - 3+ (2 = normal)

## Special tests

11. **Straight leg raise (Laseague) test:** about 70-80deg of hip flexion is normal. Sciatic / radicular pain is a positive test suggesting disk herniation. Drop limb 5deg and dorsiflex ankle.
12. **Femoral stress test** for L2/L3 nerve root compression. Lie patient prone, bend knee to 90deg and pull knee up (extend hip 15deg) with other hand on back of hip. Anterior thigh pain is a positive test.

## For Sacroiliac Joint

*Proceed as for lumbar spine examination, palpating further down.*

Pain is felt in posterior aspect of hip

### Special tests

1. **Patrick (FABER) test:** place leg in flexion, abduction, external rotation (form figure of 4). Place 1 hand on opposite ASIS and other hand on knee, press down. Pain elicited is a positive test suggesting SI joint dysfunction.
  2. **Pump handle test:** flex knee and hip maximally, take towards opposite shoulder. Increase in pain is a positive test.
  3. **Gaenslen test:** lie patient with legs dangling off edge of bed. Flex both hips and then extend hip on involved side. If this increases pain, test is positive.
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## For Scoliosis

### Inspection

1. Inspect for level of shoulders (typical idiopathic adolescent scoliosis, R shoulder likely higher)
2. Inspect for prominence of hip (typical case: R hip more prominent)

### Special tests

1. **Plumbline:** put plumbline with C7 and see whether it is in line with gluteal cleft. Measure any shift.
2. **Scoliometer:** to measure rib or lumbar hump. Place scoliometer over back of thoracic and lumbar spine.

# Orthopaedic Physical Examination of the Cervical Spine

## Look

1. **Gait:** watch for unsteady or high stepping gait.
2. **Inspect** from back, side, and front – for scars, sinuses, deformities.

## Feel

3. Ask for tenderness
4. **Palpate** from occiput down: midline and paraspinal muscles, then along shoulders – for tenderness and warmth.

## Move

5. **Active movement:** Flexion, extension, lateral bending (L/R), rotation.

## Neuro

6. **Motor:** Check bilaterally with resistance, and grade 0-5.
  - C5 – Shoulder abduction (also elbow flexion in video)
  - C6 – Elbow flexion (wrist extension in elbow?!)
  - C7 – Triceps: elbows extension
  - C8 – Finger flexion (squeeze my finger)
  - T1 – Finger abduction
7. **Sensory:** Quick estimate or light touch and pain. Grade 0 - 3+ (2 = normal)
  - C5 – Lateral arm
  - C6 – Thumb
  - C7 – Middle finger
  - C8 – Little finger
  - T1 – Medial arm.
8. **Reflexes:** biceps (C5), triceps (C7), supinator (C6), compare bilaterally. Grade 0 - 3+ (2 = normal)

## Special tests

9. **Hoffmann's test:** Cradle wrist and hold wrist, MP and IP joints in extension. Flick distal phalanx of middle finger. Positive test is when there is flexion of thumb and index finger, suggesting myelopathy.
10. **Spurling's test:** extend patient's neck backward and to the affected side. May reproduce radicular pain. If negative, do axial compression test: press down on head of patient, and see if test becomes positive
11. **Ulnar drift:** extend arms and look for ulnar deviation of little finger.