Musculo-Skeletal Examination

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Objective

At the end of this unit, the student will be able to:

- Examine the musculoskeletal system and differentiate normal from abnormal finding.
- Examine the muscle to assess tone, strength.

Anatomy and Physiology

- Musculoskeletal system consist of the body's bones, joints and muscles essential for support, to stand erect and for movement.
- They are also important to encase and protect the inner vital organs, to produce RBC in the bone marrow and for storage of minerals such as Ca++ and P++ in the bones.

Cont…d

- The skeleton is the bony framework and has 206 bones.
- The joint is the place of union of 2 or more bones and could be non- synovial (immovable) or only slightly movable (e.g. vertebrae) and synovial (freely moveable).
- The joint is surrounded by fibrous bands known as ligaments.

Cont…d

Type of Joint	Extent of Movement	Example
Synovial	Freely movable	Knee, shoulder
Cartilaginous	Slightly movable	Vertebral bodies of the spine
Fibrous	Immovable	Skull sutures

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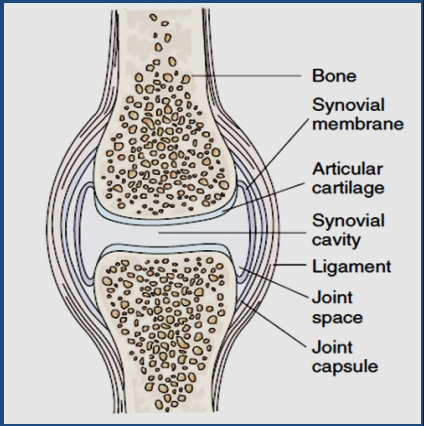
- Ligaments run directly from one bone to another that strengthen the joint and help to prevent movement in undesirable directions.
- The skeletal muscle which is under conscious control is attached to bone by a tendon and produces the following movements.



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a. Flexion- bending a limb at a joint.
b. Extension- straightening a limb at a joint.
c. Abduction- moving a limb away from the midline of the body.
d. Adduction -moving a limb toward the midline of the body.
e. Pronation -turning the forearm so that the palm is down.

Cont…d

f. Supination -turning the forearm so that the palm is up.
g. Circumduction- moving the arm in a circle around the shoulder.
h. Inversion- moving the sole of foot in ward at the ankle.
i. Eversion- moving the sole of the foot out ward at the ankle.

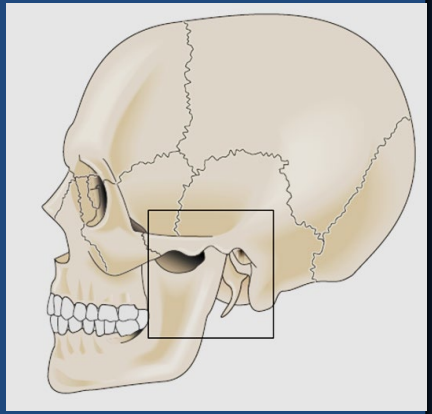
Cont…d

j. Rotation- moving the head around a central axis.
k. Protraction- moving a body part for wards and parallel to the ground.
l. Retraction- moving a body part back ward and parallel to the ground.
m. Elevation- raising a body part.
n. Depression- lowering a body part.

Cont…d

Temporomandibular joint

- The most active joint in the body, opening and closing up to 2000 times a day.
- Formed by articulation of the mandible and temporal bone.
- Feel in the depression anterior to the tragus of the ear.



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Function;

- It permits jaw function for speaking and chewing.
- To open and close the jaws.
- For protrusion and retraction.
- For side to side movement of the lower jaw.

Cont…d

Spine or vertebrae

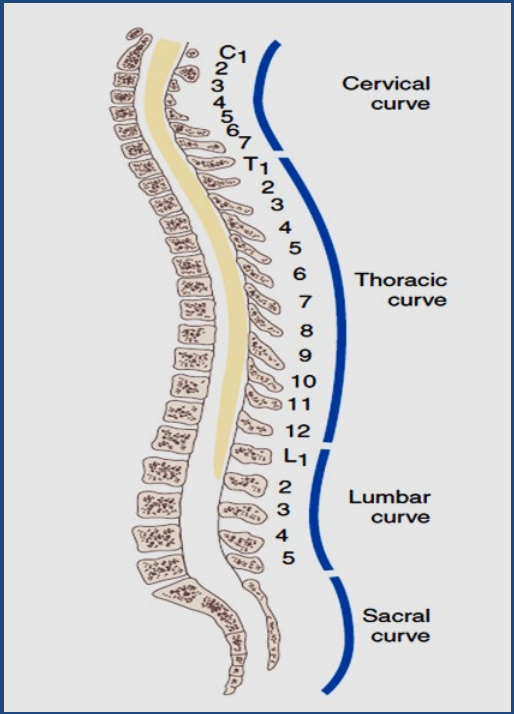
- Has 33 connecting bones (7 cervical, 12 thoracic, 5 lumbar ,5 sacral and 3-4 coccygeal vertebrae).
- Surface land mark includes;
  - The spinous process of C_7 and T_1 are prominent at the base of the neck.

Cont…d

- The inferior angle of the scapula- normally is at the level of the interspaced between T_7 and T_8.
- An imaginary line connecting the highest point on each iliac crest crosses L4.

Cont…d

- A lateral view shows that the vertebral column has 4 curves (a double S shape).
- The cervical and lumbar curves are concave (in ward) and the thoracic and sacro coccygeal curves are convex.



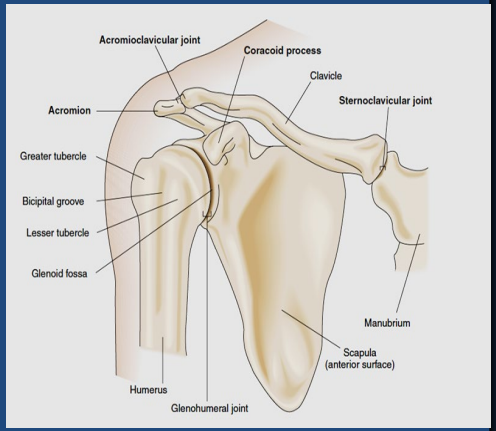
Cont…d

Shoulder

- The bones of the shoulder have palpable landmarks to guide your examination.
- The scapula and the clavicle connect to form the shoulder girdle.
- You can feel the bump of the scapula's acromion process at the very top of the shoulder.

Cont…d

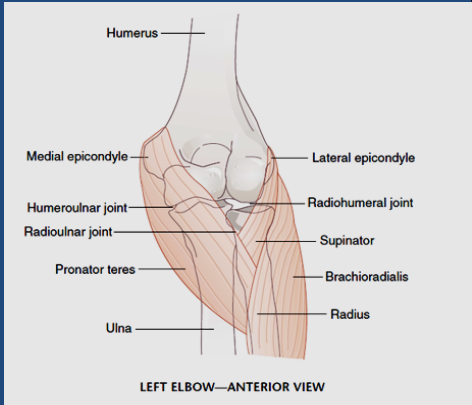
- Move your fingers in a small circle outward, down, and around which is the greater tubercle of the humerus, and from that the coracoids process of the scapula is a few centimeters medially.

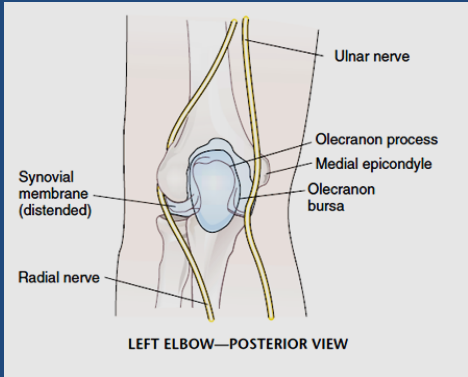


Cont…d

Elbow

- Palpable land marks are the medial, and lateral epicondyles of the humerus, and the large olecranon process of the ulna in between them.
- The sensitive ulnar nerve (leprosy) runs between the olecranon process and the medial epicondyle.





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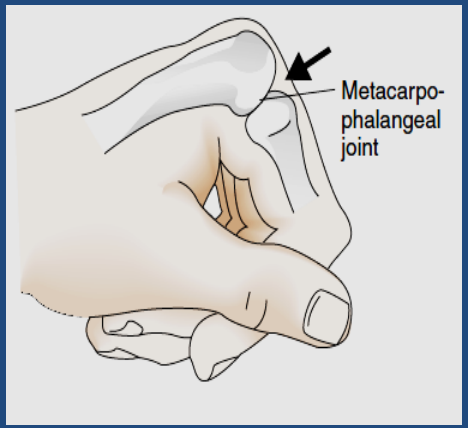
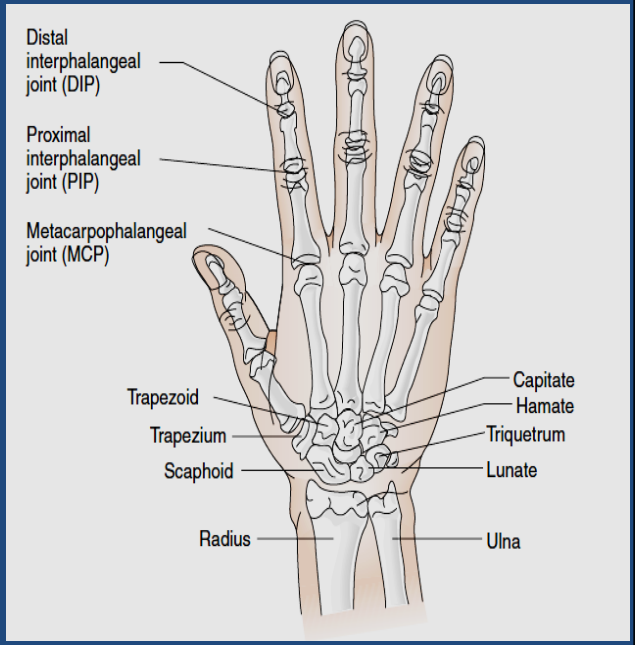
Wrist and Hand





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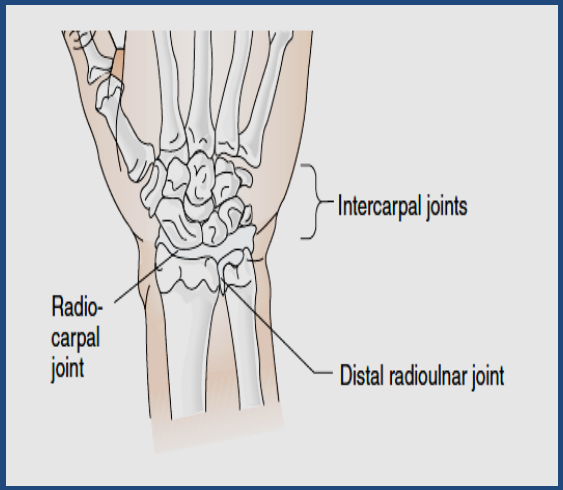
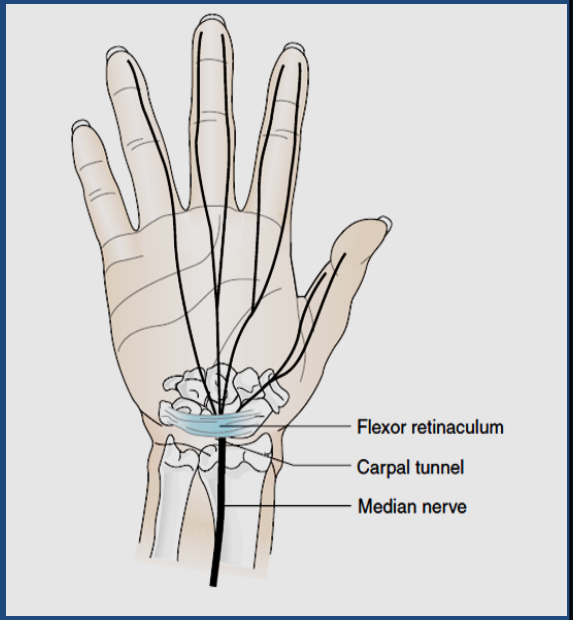
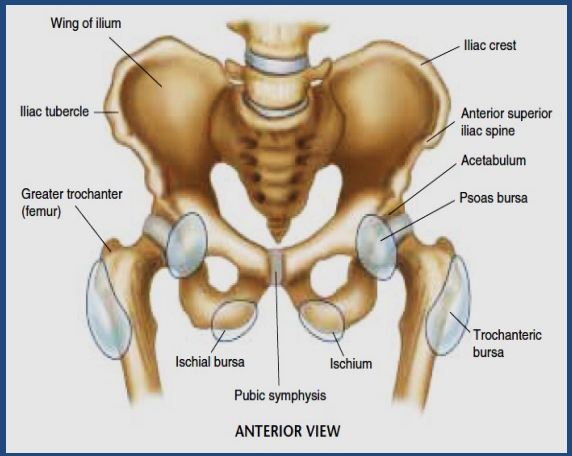
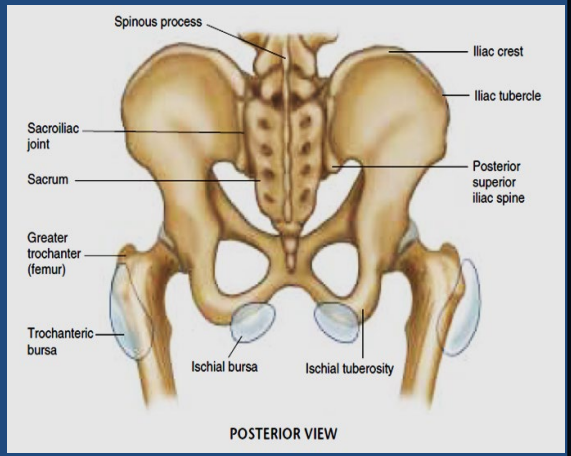

Intercarpal joints
Radio-
carpal
joint
Distal radioulnar joint


Flexor retinaculum
Carpal tunnel
Median nerve

Cont…d

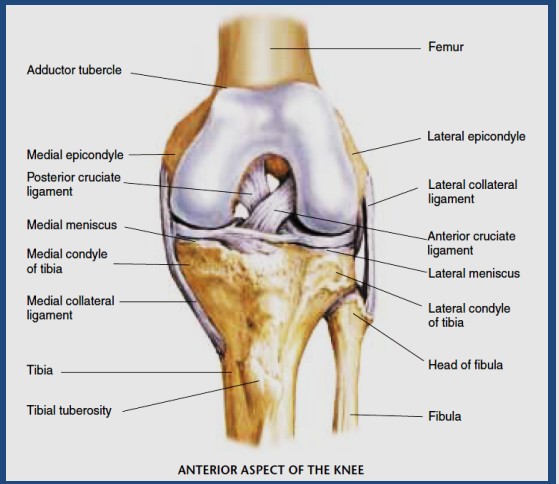
Hip


Wing of ilium
Iliac crest
Iliac tubercle
Anterior superior iliac spine
Acetabulum
Greater trochanter (femur)
Psoas bursa
Trochanteric bursa
Ischial bursa
Ischium
Pubic symphysis
ANTERIOR VIEW

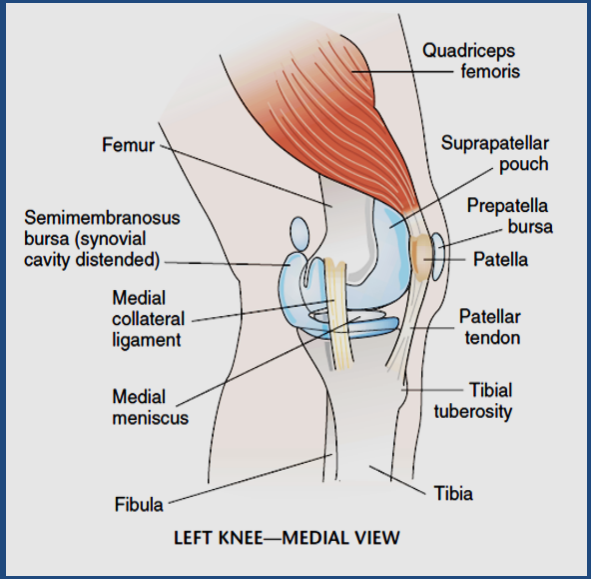

Spinous process
Iliac crest
Iliac tubercle
Sacroiliac joint
Sacrum
Posterior superior iliac spine
Greater trochanter (femur)
Trochanteric bursa
Ischial bursa
Ischial tuberosity
POSTERIOR VIEW

Cont…d

Knee



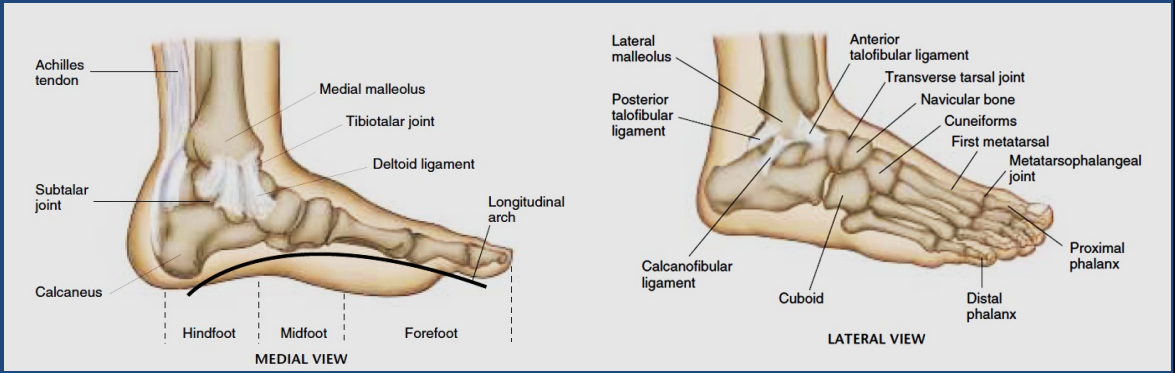
ANTERIOR ASPECT OF THE KNEE



LEFT KNEE—MEDIAL VIEW

Cont…d

Ankle and Foot



Examination

Subjective data

- Joints – pain, stiffness, swelling, heat (Arthritis, tendinitis, bursitis, osteomyelitis), limitation of movement.
- Muscles – pain (cramps), weakness
- Bones – pain, deformity, trauma (fractures, sprains, dislocations)

Cont…d

Functional assessment (ADL);

- Any limits on usual daily activities – bathing, toileting, dressing, eating, mobility- communicating.

Self care behaviors;

- Exercise program, any weight gain.

Cont…d

Objective data

- The purpose of the musculo- skeletal examination is to assess function for ADL as well as to screen for any abnormalities.

Cont…d

Order of the examination

- Inspection
- Palpation
- ROM
- Muscle strength testing

Cont…d

Inspection:

- Note the size, shape and contour of the joint. Inspect the skin and tissues over the joints for color, swelling, any masses or deformity.
- Presence of redness signals septic or gouty arthritis, or rheumatoid arthritis.

Cont…d

- Presence of swelling is significant and signals joint irritation-synovitis, excess joint fluid (effusion), or inflammation of surrounding soft tissue (tendon-tendinitis, bursa- bursitis), thickening.
- Deformities include dislocation, subluxation (partial), contracture (shortening of muscle) or ankylosis (stiffness of a joint).

Cont…d

Palpation:

- Palpate each joint, including its skin, its muscles, bony articulations, and area of joint capsules.
- Notice any heat, tenderness, swelling or masses.
- Joints normally are not tender to palpation.

Cont…d

- A small amount of fluid is present in the normal joint but it is not palpable.
- Palpable fluid is abnormal because fluid is contained in an enclosed sac.
- If you push on one side of the sac, the fluid will shift and cause a visible bulging on an other side.

Cont…d

Range of motion (ROM):

- Ask for active range of motion and if you see a limitation, gently attempt passive motion.
- Joint motion normally causes no tenderness, pain or crepitation.
- Crepitation (RA) is on audible and palpable grating that accompanies movement (cause further injury during ass't).

Cont…d

Muscle strength testing:

- Ask the person to flex and hold as you apply opposing force.
- Muscle strength should be equal bilaterally and should fully resist your opposing force.

Grading Muscle Strength

Grade	Description	Percent	Ass't
5	Full ROM against gravity with, full resistance	100	Normal
4	Full ROM against gravity, some resistance	75	Good
3	Full ROM with gravity	50	Fair
2	Full ROM with gravity eliminated (Passive motion)	25	Poor
1	Slight contraction	10	Trace
0	No contraction	0	Zero

Method of examination

Temporomandibular joint;

- With sitting position, inspect the area just anterior to the ear (tragus).
- Place the tips of your first two fingers in front of each ear (tragus) and ask the person to open and close the mouth.
- Protrude lower jaw and move it side to side.
- Abnormal:- swelling, crepitus and pain suggests trauma, arthritis, meniscus injury.

Cont…d

Cervical spine;

- The spine should be straight and the head erect. Double “S” shape in lateral view.
- Palpate the spinous process, sternomastoid and trapezius muscles.
- They should feel firm with no muscle spasm (torticollis), or tenderness.

Cont…d

- Ask for flexion (45^0), extension (55^0), lateral bending (40^0) and rotation (70^0).
- Apply opposing force and normally maintains flexion against your resistance.
- This tests integrity of CN XI.
- Limited ROM (arthritis, muscle strain); pain with movement, and failure of holding flexion are abnormal findings.

Cont…d

Upper extremity;

Shoulder;

- Inspect and compare both shoulders posteriorly and anteriorly.
- Compare shoulders for equality of bony land marks.
- Normally there is no redness, muscular atrophy, deformity or swelling.

Cont…d

- Palpate both shoulders, noting any muscular spasm or atrophy, swelling, heat or tenderness.
- Start at the clavicle, the acromioclavicular joint, scapula, tubercle of humerus.

Cont…d

- Test ROM by performing forward flexion, hyper extension, abduction, abduction, internal rotation and external rotation.
- Abnormal:– limited ROM (bursitis, capsulitis, rotator cuff tears or sprains, or tendinitis), asymmetry (scoliosis), painful or crepitus motion, atrophy (cervical nerve lesion).

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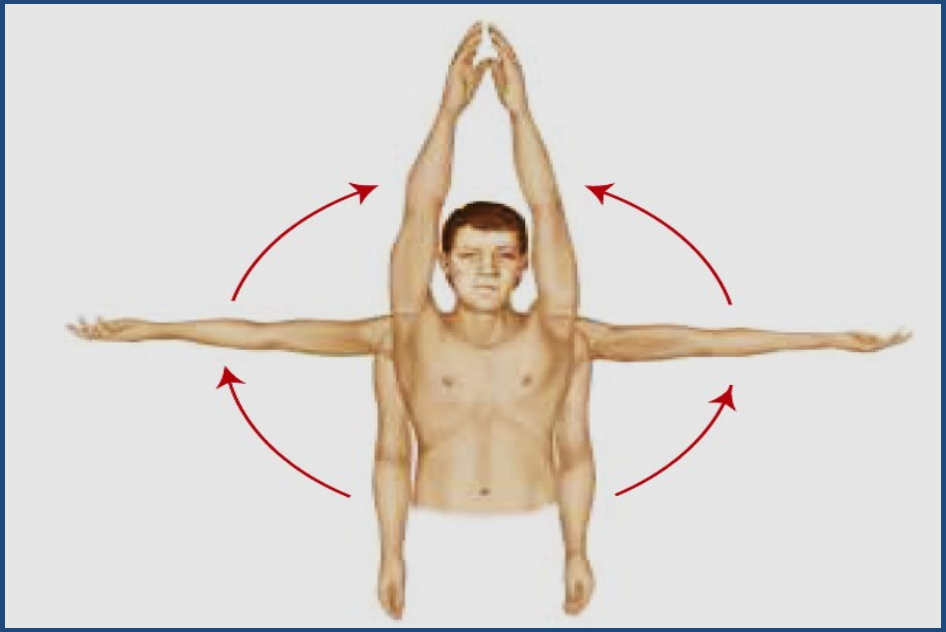

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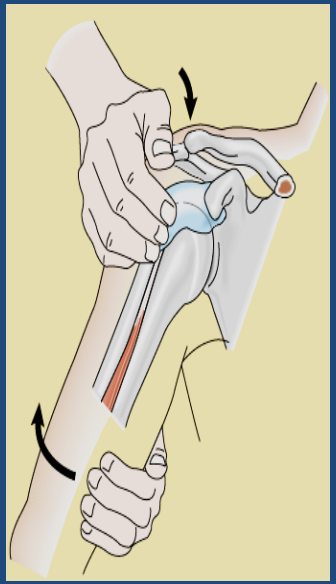

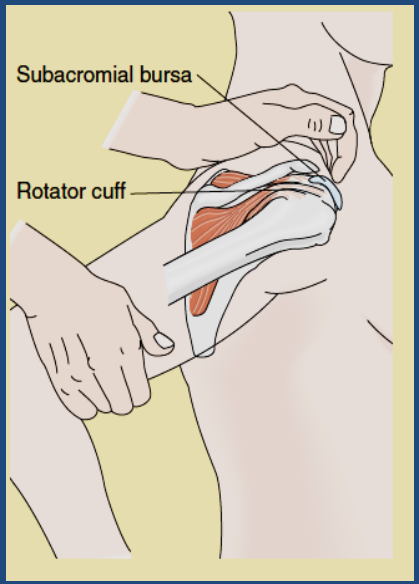

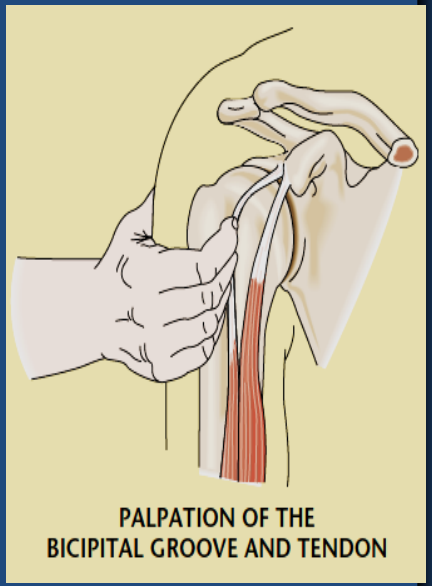

PALPATION OF THE
BICIPITAL GROOVE AND TENDON

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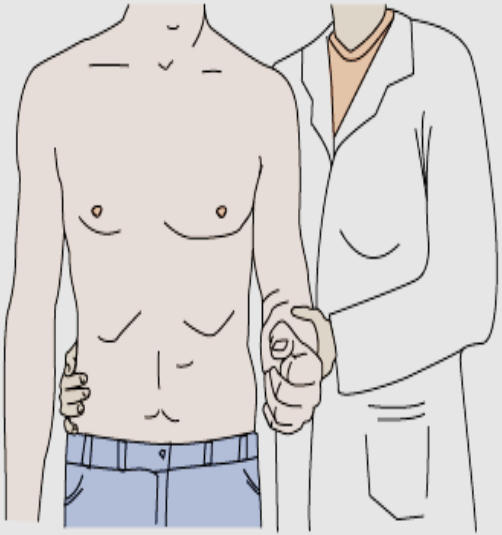
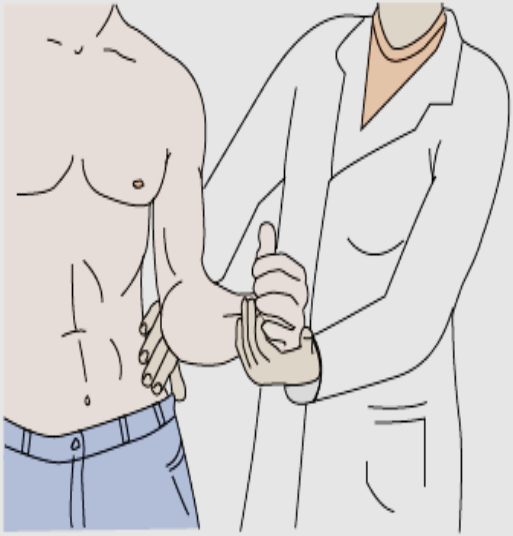
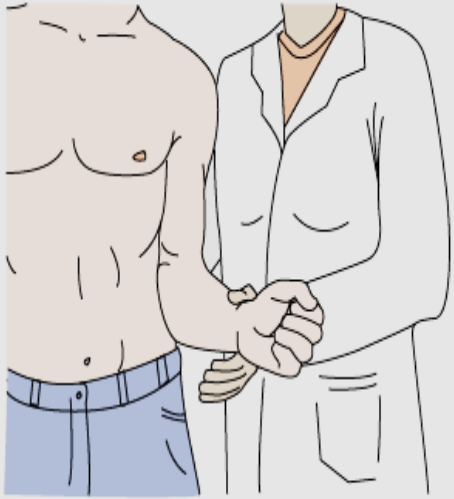


Supraspinatus: Patient abducts against resistance.

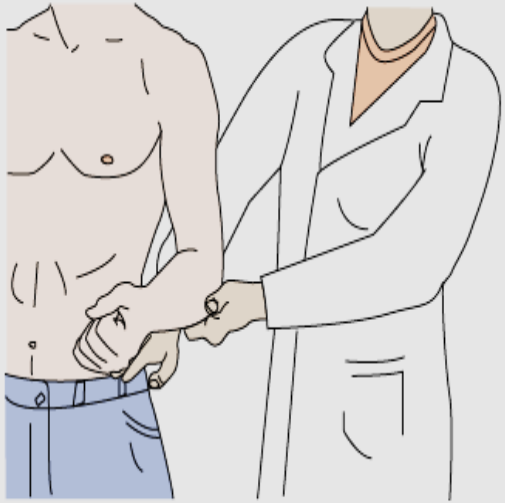


Subscapularis: Patient rotates forearm medially against resistance.

Cont…d



Infraspinatus, teres minor: Patient rotates forearm laterally against resistance.



Thoracohumeral group: Patient adducts forearm against resistance.

Cont…d

Elbow;

- Inspect the size and contour of the elbow in both flexed and extended positions.
- Look for any deformity, redness, or swelling of olecranon bursa.

Cont…d

- Palpate with the elbow flexed (70°).
- Use your left hand to support the person's left forearm and palpate the olecranon process, the medial and lateral epicondyles of humerus- with your right thumb and fingers, palpate the area of the olecranon bursa for heat, swelling, tenderness, consistency or nodules.

Cont…d

Abnormal:-

- Subluxation of the elbow, swelling and redness of the olecranon bursa (olecranon bursitis, arthritis), tenderness on epicondyle (lateral epicondylitis- tennis elbow and medial epicondylitis- pitcher's or golfer's elbow), effusion and subcutaneous nodules (RA) (raised, firm, non tender).

Cont…d

- Test ROM by asking the person to make flexion of elbow (150^0-160^0), extension (0^0), pronation (90^0) and supination (90^0). Some lack 5-10^0 flexion, others 5-10^0 hyperextension.

Cont…d

- To test muscle strength, have the person flex the elbow against your resistance on the wrist and ask the person to extend the elbow against your resistance.

Cont…d

Wrist and hand;

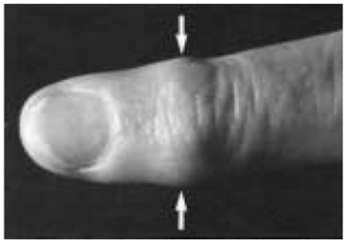
- Inspect the hands and wrists on the dorsal and palmar sides.
- Normally there is no swelling or redness, deformity or nodules.
- Palpate each joint in the wrist and hands.

Cont…d

- Facing the person, support the hand with your fingers under it and palpate the wrist firmly with both your thumbs on its dorsum
- Move your palpating thumbs side to side to identify the normal depressed areas.
- Normally the joint surfaces feel smooth, with no swelling, nodules or tenderness.

Cont…d

- Palpate the metacarpophalangeal joints with your thumbs and use your thumb and index finger in a pinching motion to palpate the sides of the interphalangeal joints.
- Normally there is no thickening, tenderness, warmth or nodules.
- Heberden's and Bouchard's nodules (hard and nontender)-osteoarthritis.



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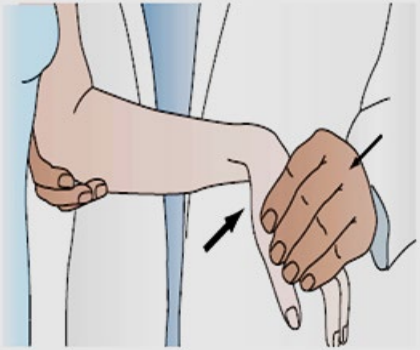
- Test ROM by asking the person to do flexion (90^0) and extension (70^0) of the hand and wrist.
- Flexion at the metacarpophalangeal joints, spread fingers apart, make a first touch the thumb to each finger and to base of little finger.

FLEXION



EXTENSION

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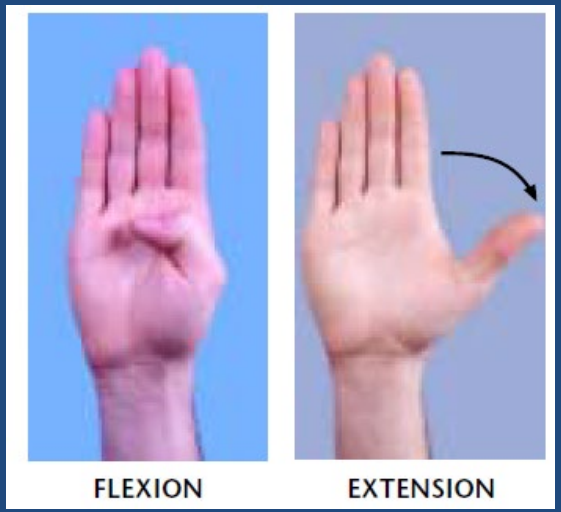

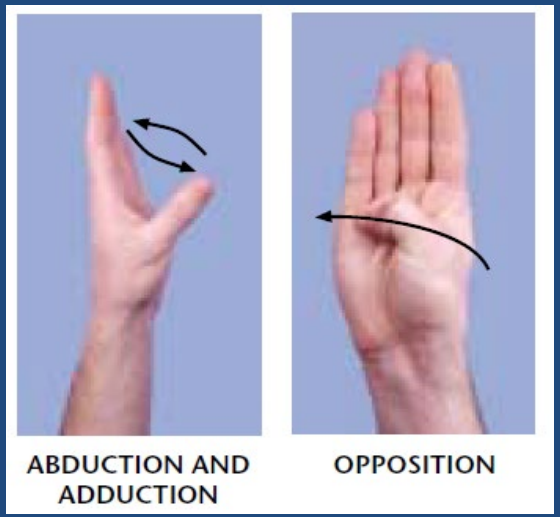

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- For muscle testing, position the person's forearm supinated (palm up) and ask the person to flex the wrist against your resistance at the palm.

Abnormal:-

- Deformity, tenderness, swelling, (osteoarthritis, rheumatoid arthritis, *tenosynovitis, synovitis,* gonococcal tenosynovitis), limited ROM (arthritis, tenosynovitis, Dupuytren's contracture).

Cont…d

Phalen's test

- Ask the person to hold both hands back to back while flexing the wrists 90 degree.
- Acute flexion of the wrist for 60 seconds produces no symptoms in the normal hand.
- Phalen's test produces numbness and burning in a person with carpal tunnel syndrome.

Cont…d

Tinel's sign

- Direct percussion of the location of the median nerve at the wrist produces no symptoms in the normal hand.
- In carpal tunnel syndrome, percussion of the median nerve produces burning and tingling along its distribution which is a positive indication of Tinel's sign.

Cont…d

Lower extremity

Hip;

- Inspect the hip joint together with the spine a bit later in the examination as the person stands.
- At that time, note symmetric levels of iliac crests, gluteal folds and equally sized buttocks.

Cont…d

- A smooth even gait reflects equal leg lengths and functional hip motion.
- Help the person in to a supine position, and palpate the hip joints.
- The joints should feel stable and symmetric with no tenderness or crepitation.

Cont…d

- Assess ROM by asking the person to do hip flexion with knee straight (90^0), hip flexion with knee flexed (120^0);

HIP FLEXION AND FLATTENING OF LUMBAR LORDOSIS

Cont…d

- Abduction (45^0) and adduction (30^0) with extended legs and hyper extension (15^0) (prone position).
- Restricted abduction-osteoarthritis

Cont…d

- Internal (40^0) and external (45^0) rotation, knee flexed.
- Restriction of internal rotation-arthritis.

Cont…d

Knee;

- With supine position and extended legs, inspect the knee's shape and contour.
- Normally it is concave or hollows on either side of the patella.
- Check them for any sign of swelling.
- Hollows disappear and may bulge with synovial thickening or effusion.

Cont…d

- Palpate the thigh with your thumb and fingers and note any warmth, tenderness, thickening or nodularity.
- When swelling occurs check whether it is due to soft tissue swelling or increased fluid on the joint.

Thickening, bogginess, or warmth in these areas indicates synovitis or nontender effusions from osteoarthritis.

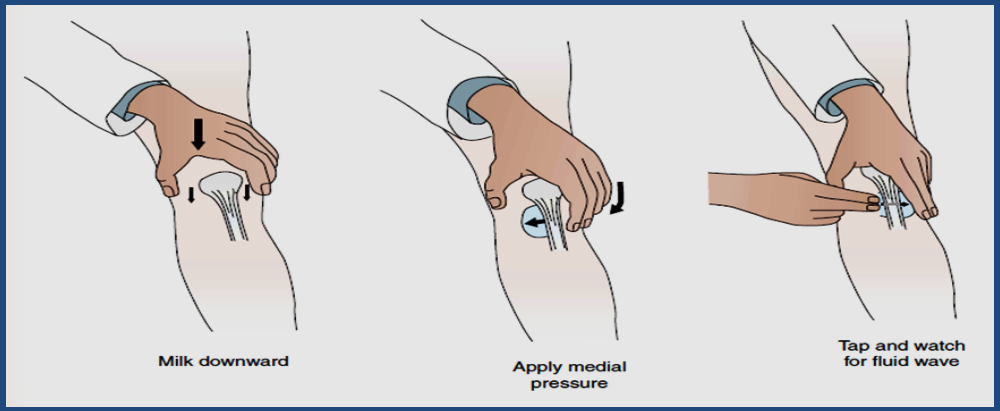
Cont…d

- Two test for patella assessment;
  - Bulge sign test.
  - Ballottement test.

Cont…d

Bulge sign test of patella

- For swelling in the suprapatella pouch, the bulge sign confirms the presence of fluid.
- Firmly stroke up on the medial aspect of the knee two to three times to displace any fluid.
- Tap the lateral aspect. Watch the medial side in the hollow for a distinct bulge from a fluid wave. Normally there is none occurs with small amount of effusion (4-8ml).



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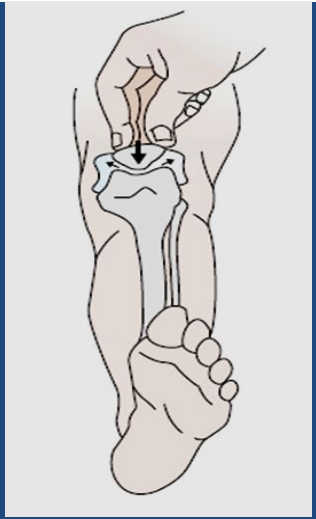
<u>Ballottement test of patella</u>

- This test is reliable where larger amount of fluid are present.
- Use your left hand to compress the suprapatellar pouch
- With your right hands push the patella sharply against the femur.



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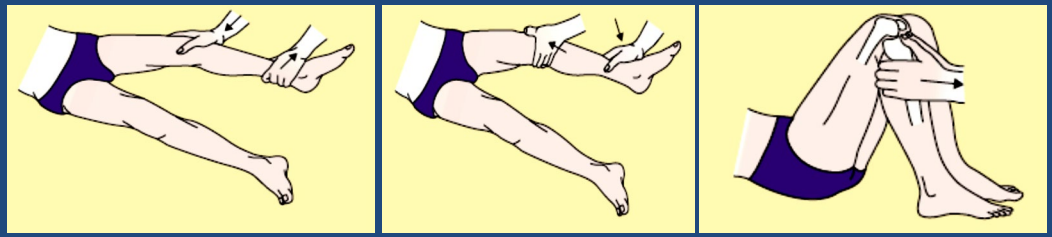
- If no fluid is present, the patella already is snug against the femur.
- If fluid has collected your tap on the patella displaces the fluid and you will hear a tap as the patella bumps up on the femur.
- Check ROM by asking the person to do knee flexion and extension.



Cont…d

Ankle and foot;

- Support the ankle by grasping the heal with your fingers while palpating with your thumb.
- Explore the joint spaces.
- They should feel smooth and depressed with no swelling or tenderness.

Cont…d

- Palpate the metatarsophalangeal joints between your thumb on the dorsum and your fingers on the plantar surface
- Tenderness- rheumatoid arthritis, gout.

Cont…d

- Using a pinching motion of your thumb and forefinger, palpate the interphalangeal joints on the medial and lateral sides of the toes.
- Pain and tenderness, called metatarsalgia, seen in trauma, arthritis, vascular compromise

Cont…d

- Test ROM by asking the person to do dorsiflexion (20^0), plantar flexion (45^0), inversion (30^0) and eversion (20^0) of foot.

INVERSION

EVERSION

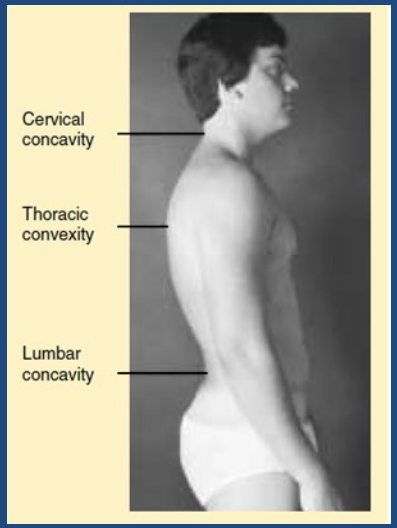
Cont…d

- Assess muscle strength by asking the person to maintain dorsiflexion and plantar flexion against your resistance.

Cont…d

Spine;

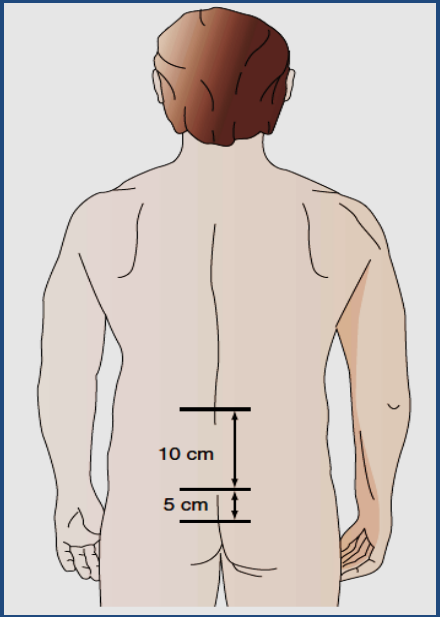
- With standing, inspect the entire back and note if the spine is straight from up to down.
- A difference in shoulder elevation and in level of scapulae occurs with scoliosis.

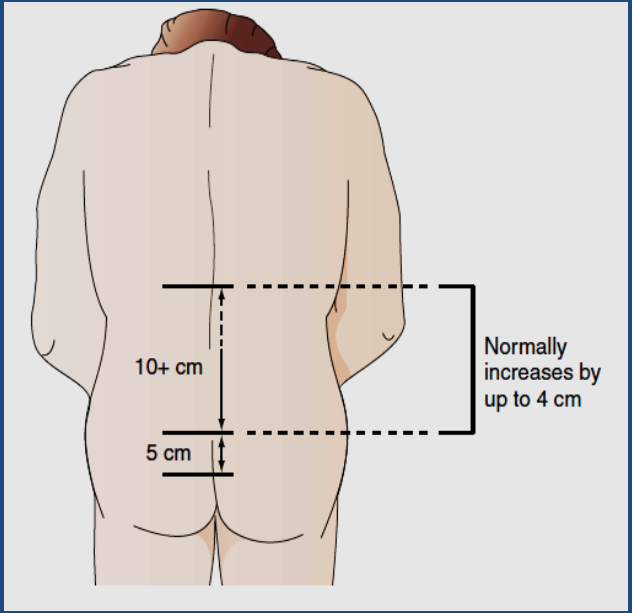


Cont…d

- From side note the normal convex thoracic curve and the concave lumbar & cervical curve.
- Palpate the spinous processes and are non- tender.
- Check ROM of the spine by asking the person to bend forward and touch the toes. Concave lumbar should disappear and back should have convex C shaped curve.

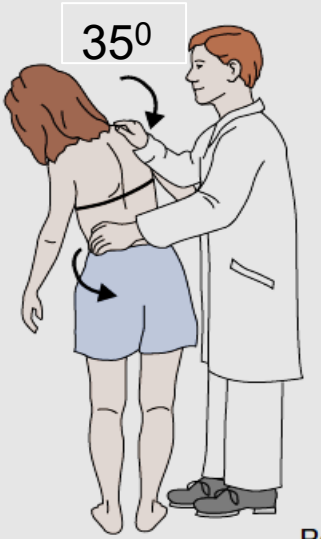
Cont…d

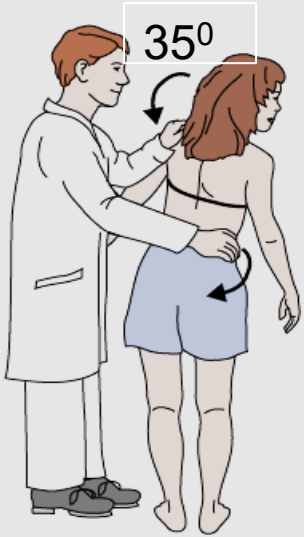




Cont…d

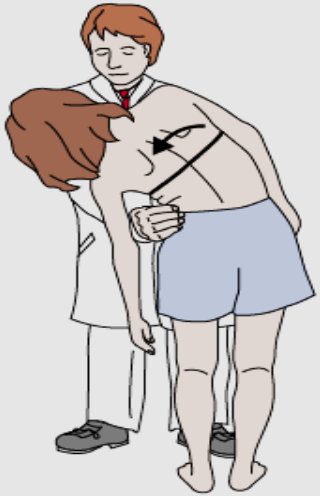
Extension

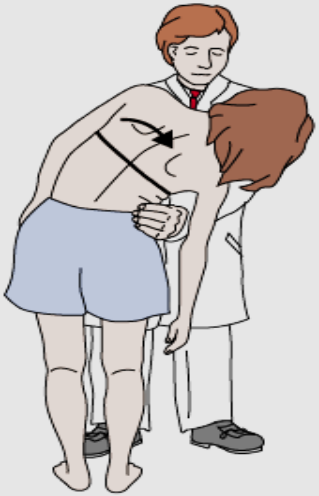




Rotation

Cont…d





Lateral bending 35^0

Nursing Diagnosis

- Pain related to muscle spasm as manifested by immobilization.
- Potential fro trauma related to balance difficulty.
- Impaired physical mobility related to neuromuscular impairment as manifested by limited range of motion.

Thank you for your attention!!!