Head, Shoulders, Knees and Toes

Office Based Orthopaedic Evaluation

JOHNS HOPKINS
MEDICINE

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Disclosures

I have nothing to disclose

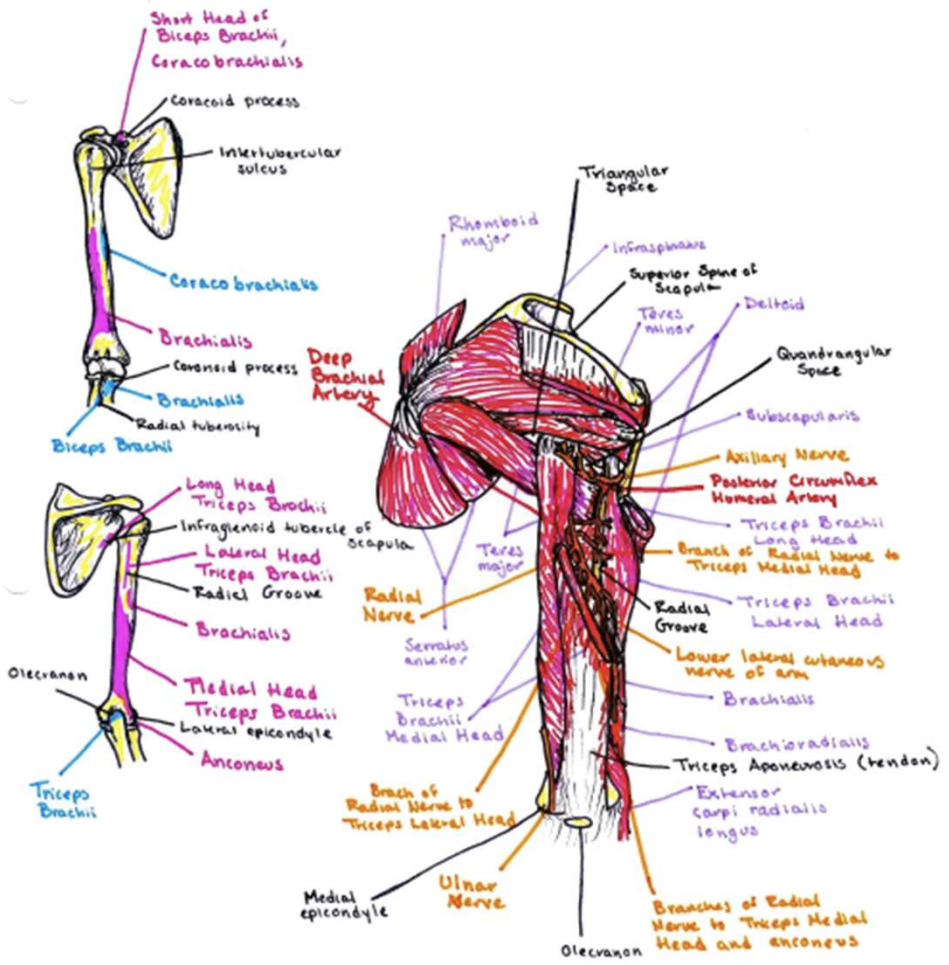
Learning Objectives

- At the conclusion of the presentation, participants will know the key components of the physical examination for the knee, shoulder, elbow, hip and ankle
- At the conclusion of the presentation, participants will know when to perform radiographs and what views to order
- At the conclusion of the presentation participants will appropriately refer to the proper specialist

Areas Covered

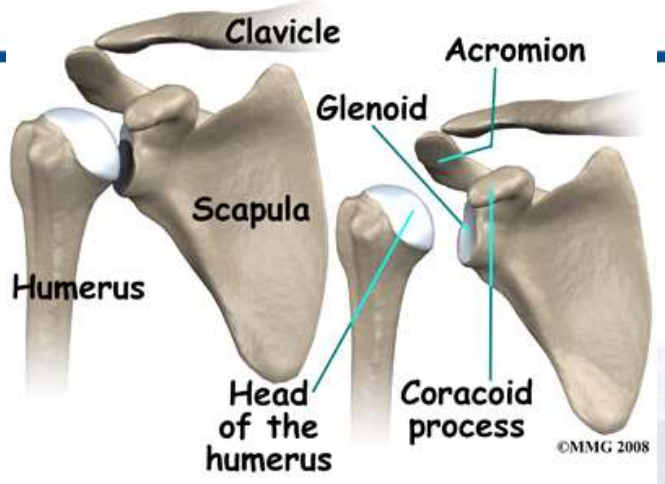
- Shoulder
- Elbow
- Hip
- Knee
- Ankle

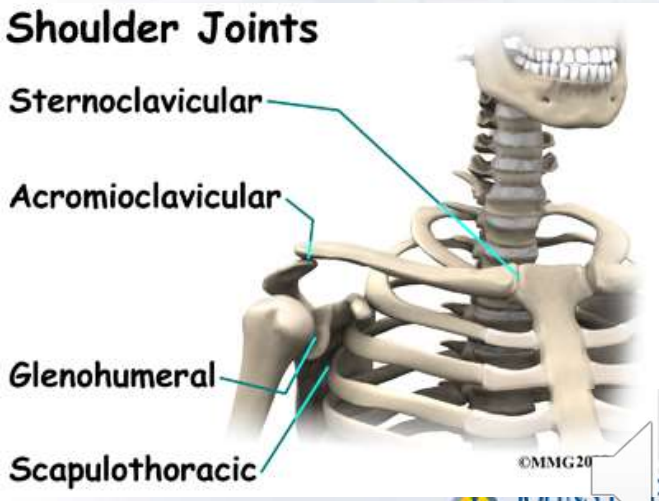
Shoulder



Shoulder Overview

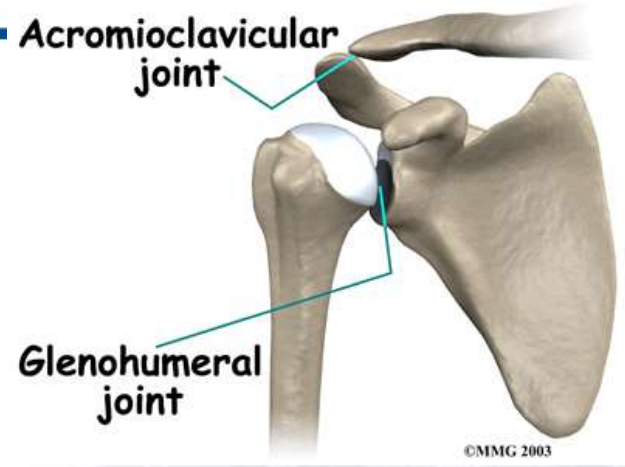
- Anatomy
- Diagnosis
- History
- Physical Exam
- Imaging Studies
- Non-op treatment

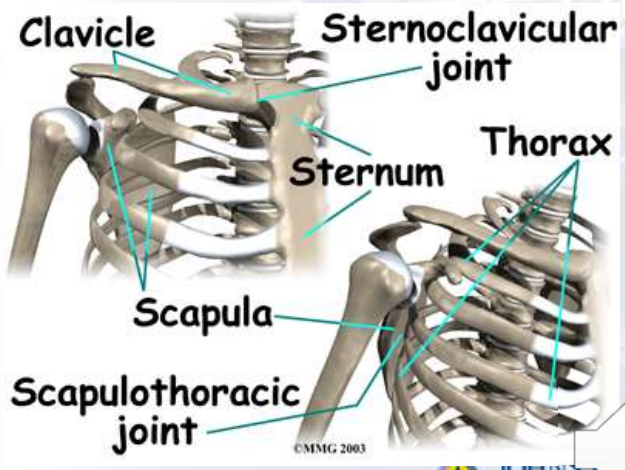




Shoulder Conditions

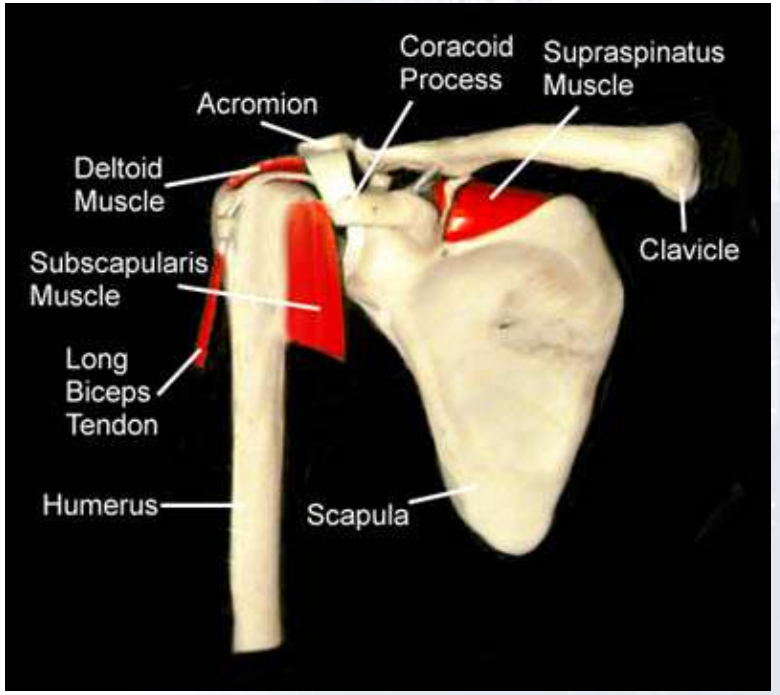
- Impingement
- Rotator cuff tears
- AC joint injuries
- Shoulder instability
- Biceps - SLAP tears
- Frozen Shoulder





Shoulder Anatomy

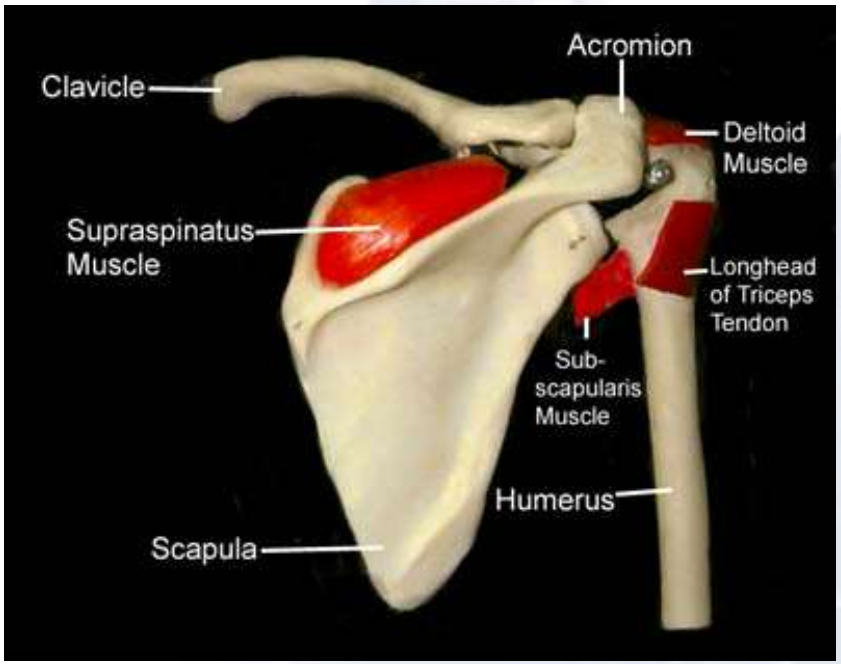
- Acromion
- CA ligament
- AC Joint
- Coracoid Process
- CC ligaments
- Bursae
  - Subacromial
  - subdeltoid
    - Decrease friction
    - Protect muscle
    - Cushion bone



Rotator Cuff Anatomy

FUNCTION

- Rotation
  - – Abduction
    - Supraspinatus
  - – Internal Rotation
    - Subscapularis
  - – External Rotation
    - 80% Infraspinatus
    - 20% Teres Minor
- *Dynamic Stabilization*



Clinical History

- Activity-related pain & weakness
  - when arm positioned away from body
  - especially w/ overhead motion
- Night-time pain
  - difficulty sleeping
  - “can’t get comfortable”
- Interference with ADL’s
  - “can’t reach back pocket”
  - “can’t undo bra”
  - “can’t reach in purse”

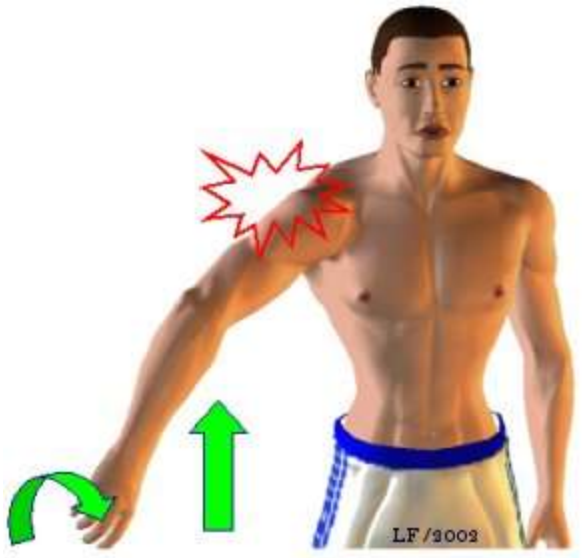
Focused History Questions

Characteristics of pain

Night pain when lying on affected side, muscle atrophy	Rotator cuff syndrome/subacromial or subdeltoid bursitis
< 30 yo	Biomechanical, inflammatory
> 45 yo, Hx of trauma	Rotator cuff tear - 35% of pts
Painful arc (60-120°abduction)	Subacromial impingement
Pain > 120° abduction	Acromioclavicular joint
Catching, popping, clicking	GH or AC joint arthritis, labral tear

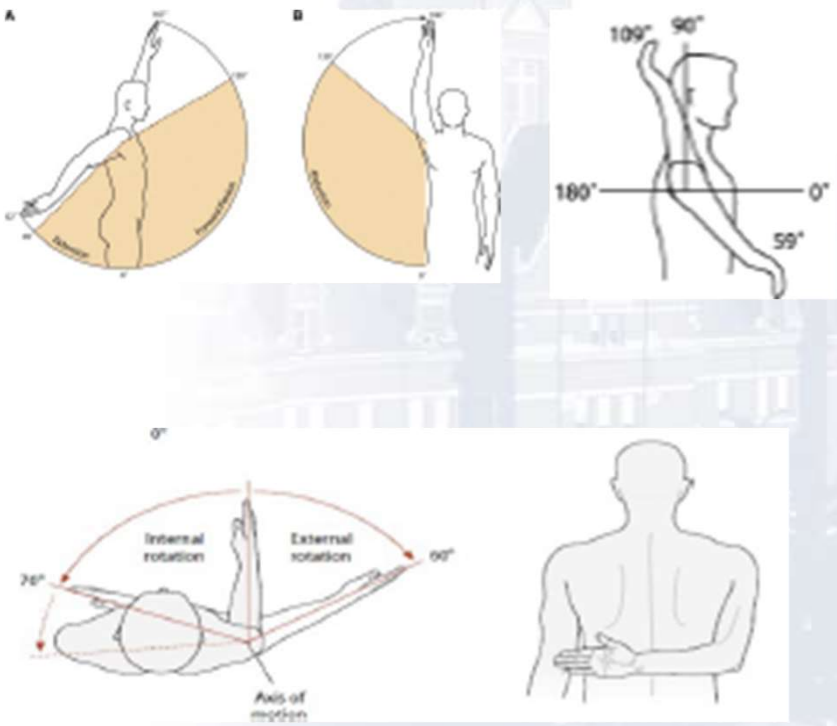
Physical Examination

- Inspection
  - Skin
  - Scars
  - Symmetry
  - Swelling
  - Atrophy
  - Hypertrophy
  - Scapular Winging



Physical Examination

- Shoulder Elevation
  - 150°-180° (considered normal)
- Shoulder Extension
  - 45°
- Shoulder Abduction
  - 150°-180° (with palms forward)
- Shoulder ER with arm at 90/90
  - 80° - 90 °
- Shoulder IR with arm at 90/90
  - 70 °- 90 °
- Shoulder ER with arm at side, elbow flexed
  - 0° to 90°
- Shoulder IR (behind back)
  - T-10

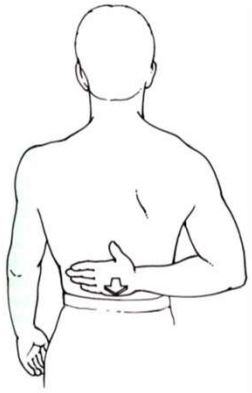


Physical Exam
Strength Testing

SS
Supraspinatus
Abduction > 90º

IS
Infraspinatus
ER w/ arm add to body

TM
Teres Minor
ER w/ arm abd & ER 90º



SC
Subscapularis
"Lift off test"
"Belly press"

Physical Exam

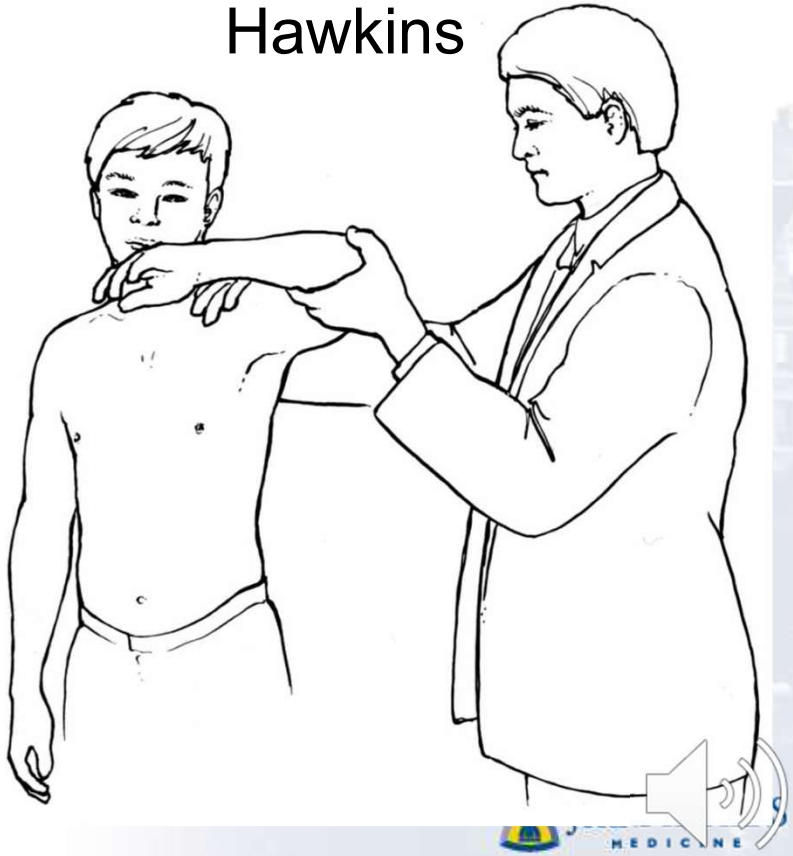
Impingement Signs

Neer
Forward flexion while resisting scapular rotation

Hawkins
Internal rotation w/ arm abd & ER 90º while resisting scapular rotation

Neer

Hawkins

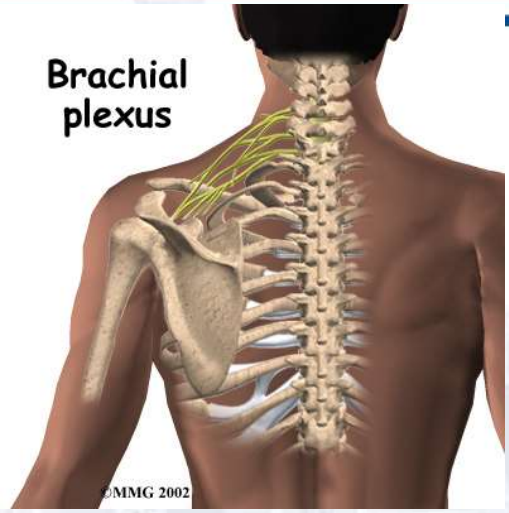


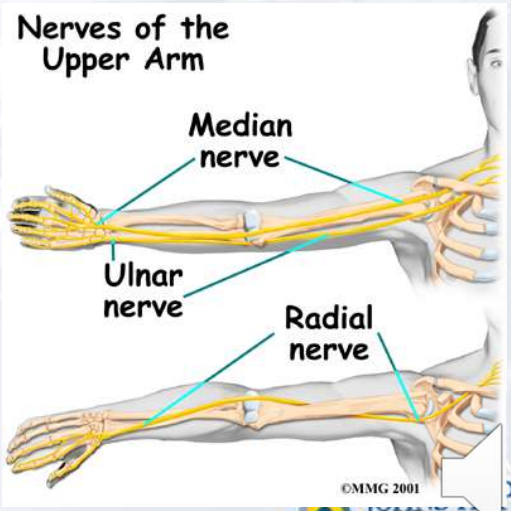
Physical Exam

Cervical Spine Exam

- Similar symptoms
  - Cervical radiculopathy
  - Brachial plexitis
- Evaluate:
  - sensation
  - motor strength
  - deep tendon reflexes

- *Should include with every shoulder exam*





Radiographic Imaging

Zanca view or AP view

- Evaluate AC joint
  - degenerative changes
  - assess humeral head migration

Zanca View

Grashey View

- True AP or Glenoid View

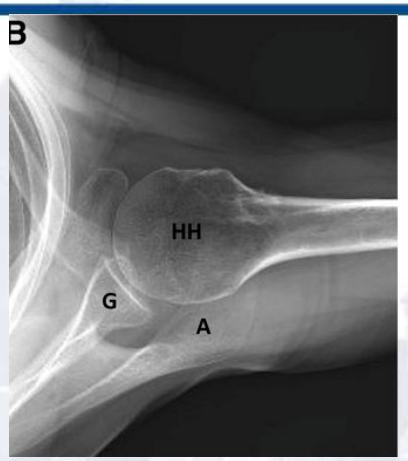
Grashey View

Radiographic Imaging

Axillary View

- evaluate GH joint
  - DJD
  - glenoid wear

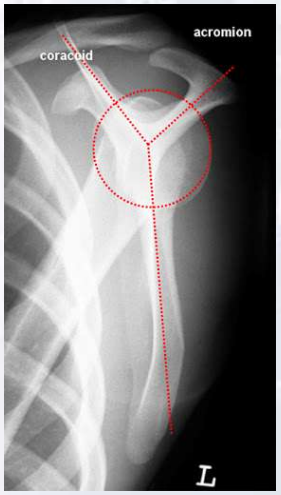
Axillary lateral View

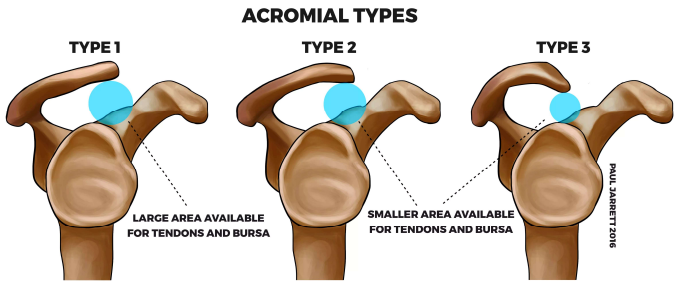


Outlet View - "Y"

- acromial shape
- SA spurs

Scapular/Outlet View





Differential Diagnosis

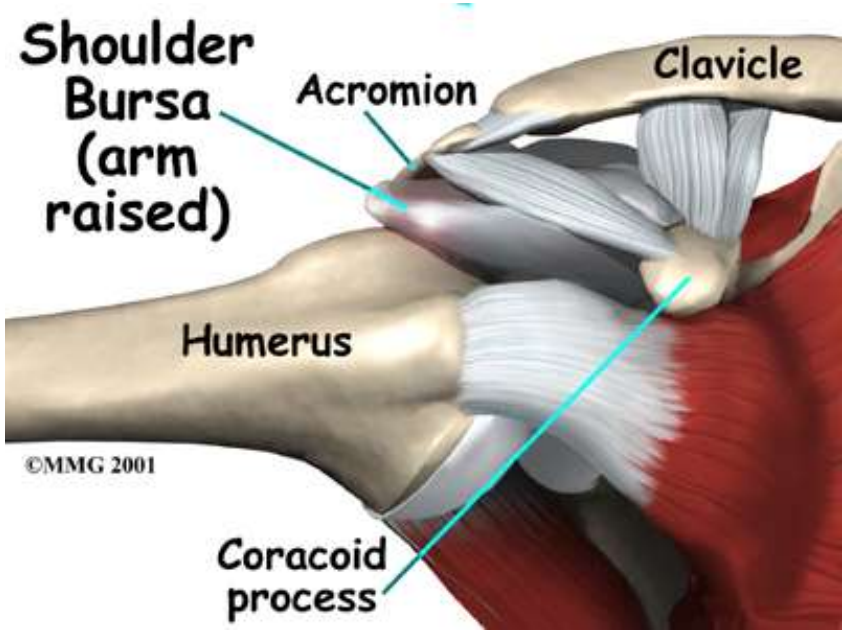
Diagnosis	Primary Care %	Age (SD)
Subacromial Impingement Syndrome	48-72	23-62 (10)
Adhesive Capsulitis	16-22	53 (10)
Acute Bursitis	17	-
Calcific Tendonitis	6	-
Myofascial Pain Syndrome	5	-
Glenohumeral Joint Arthrosis	2.5	64 (10)
Thoracic Outlet Syndrome	2	-
Biceps Tendonitis	0.8	-

Impingement Syndrome

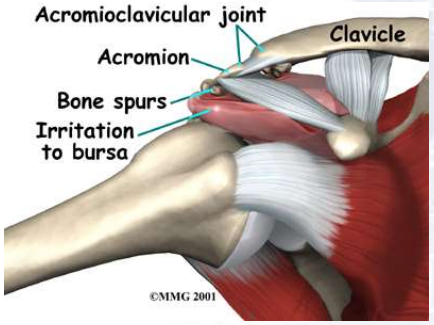
Age-related tendinosis of the rotator cuff
Chronic inflammation of subacromial bursa
Bone spurs in SA space and AC joint

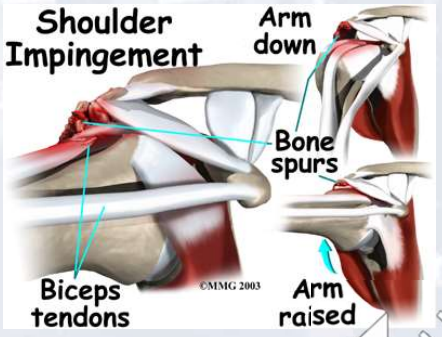
Mechanical phenomenon
Not enough space for greater tuberosity to fit under CA ligament
Results in painful arc of ROM (70 - 120)

Normal



Impingement





JOHNS HOPKINS MEDICINE

Non-operative Treatment

Rotator cuff degeneration is a natural part of aging and many RC tears are asymptomatic

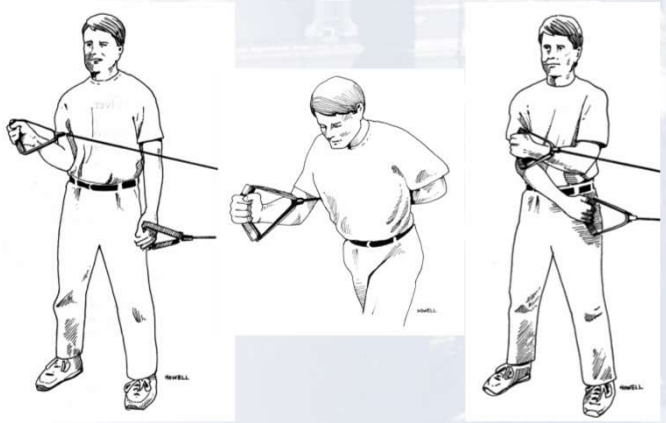
- Activity Modification
  - Rest
  - Avoidance of overhead activity
  - Work-site restrictions
  - Limit recreational activity

- NSAIDs
  - Ibuprofen, Naproxen, Diclofenac, Meloxicam
    - GI intolerance
    - Renal toxicity
  - Celebrex

Non-operative Treatment

- CORTICOSTEROID INJECTIONS
  - –Sub-acromial space
  - –AC joint
  - –Biceps tendon sheath

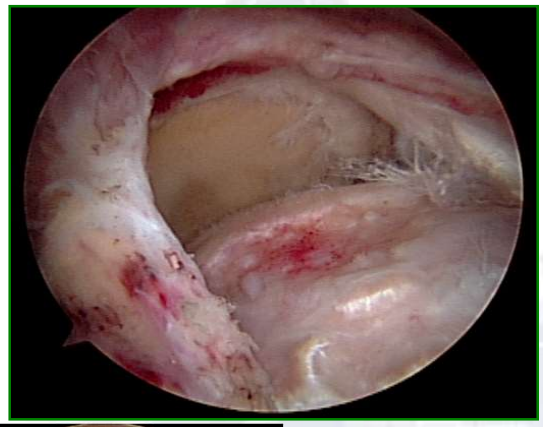
- •Can only use every 4 mos
  - – tendon degeneration
  - – *calcific tendonitis*
  - – chondrolysis
  - – infection risk
- •*Often limit to 2-3 injections*
- •PHYSICAL THERAPY
  - –Strengthening scapular stabilizers
  - –Strengthening rotator cuff muscles



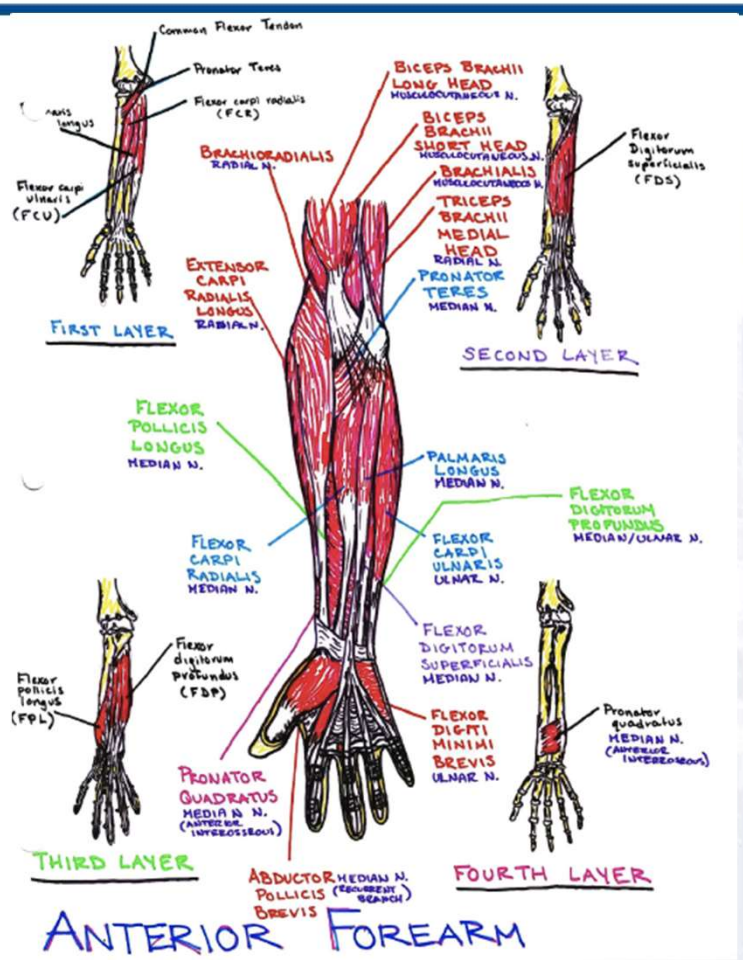
Operative treatment

Glenohumeral Joint
- Debridement
  - degen. labral tears
  - biceps tendinosis
- Inspect RC - articular

Subacromial Space
- SA & SD bursectomy
- Acromioplasty
- Distal clavicle excision
- Re-inspect RC - bursal
- Consider microtenotomy



Elbow Evaluation



“….just a hinge between the shoulder and the wrist.”

Elbow Range of Motion

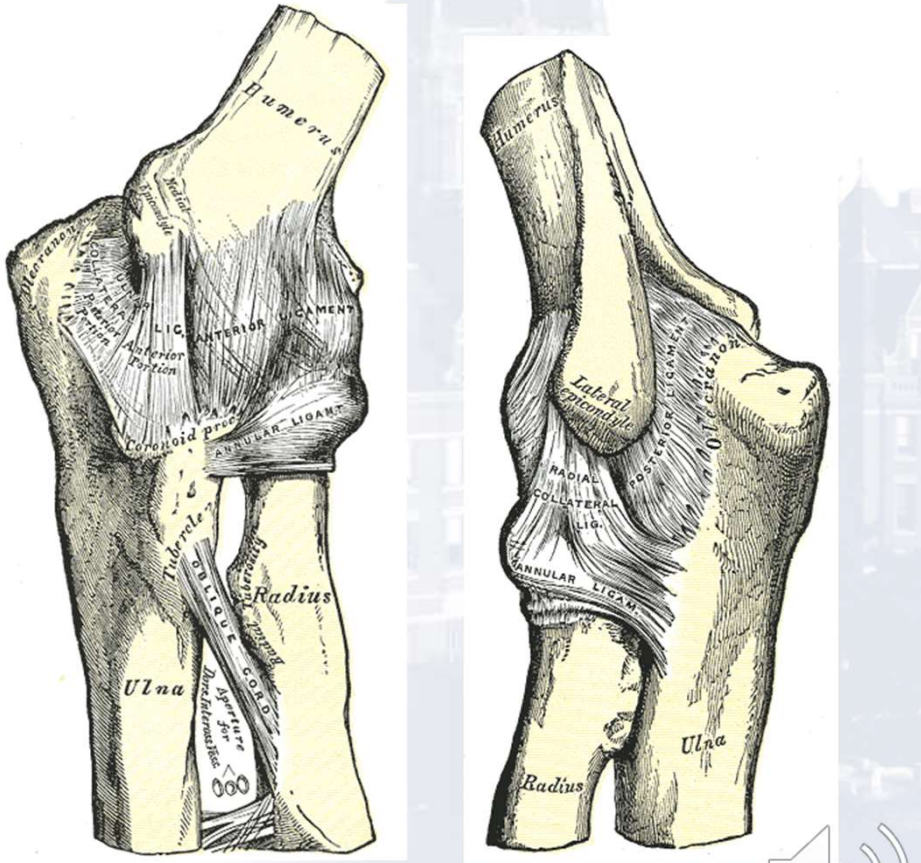
- Flexion 135° to 145°
- Extension 10° to-10°
- Pronation 80°
- Supination 80°

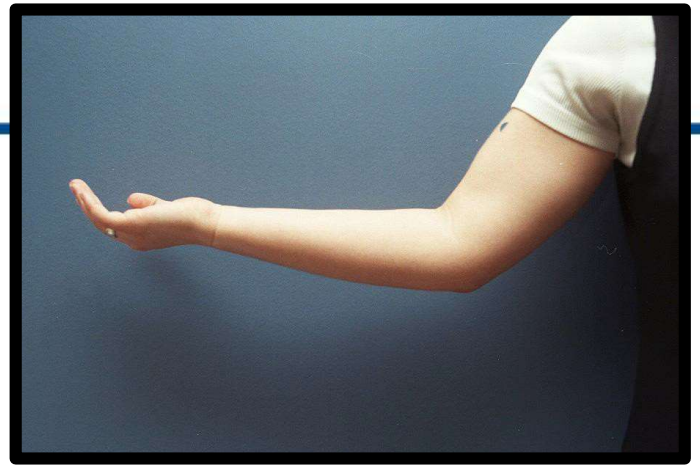
Functional range

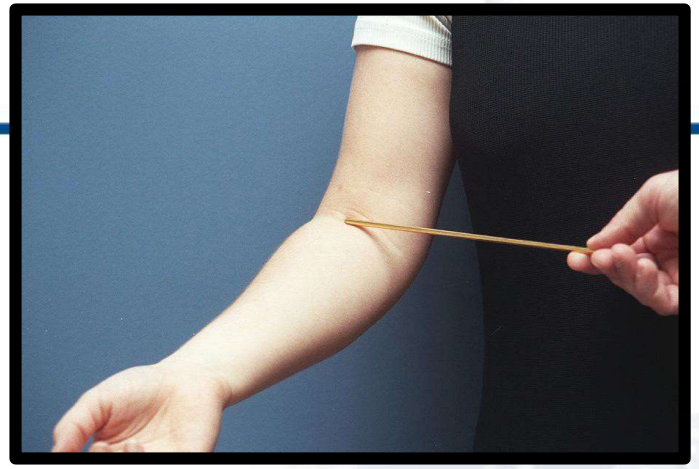
- Flexion 30° - 130°
- Pronosupination 50° - 0° - 50°

Physical Exam Maneuvers

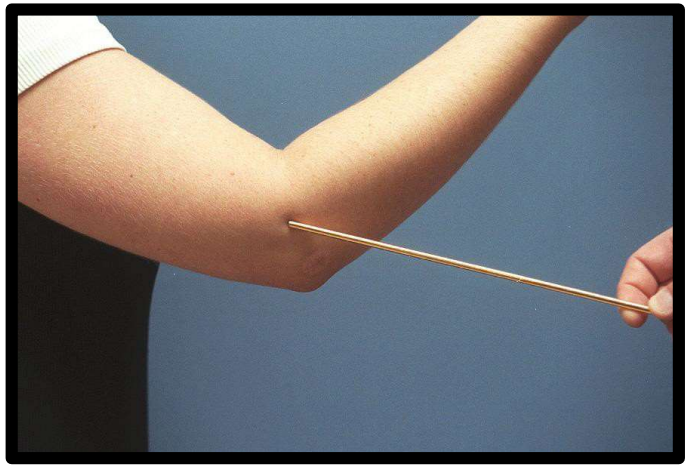
- Inspection
- Palpation
- Range of Motion
- Muscle Strength
- Special Tests
- Always think about the joint above and below where the pain is and examine that joint

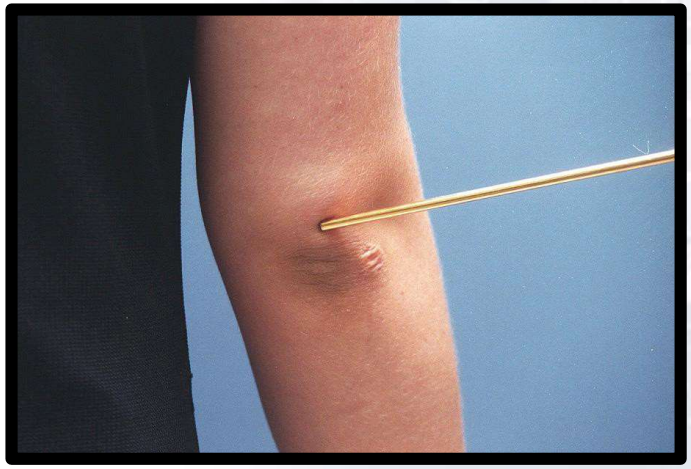






Inspection





PALPATION

MEDIAL PALPATION

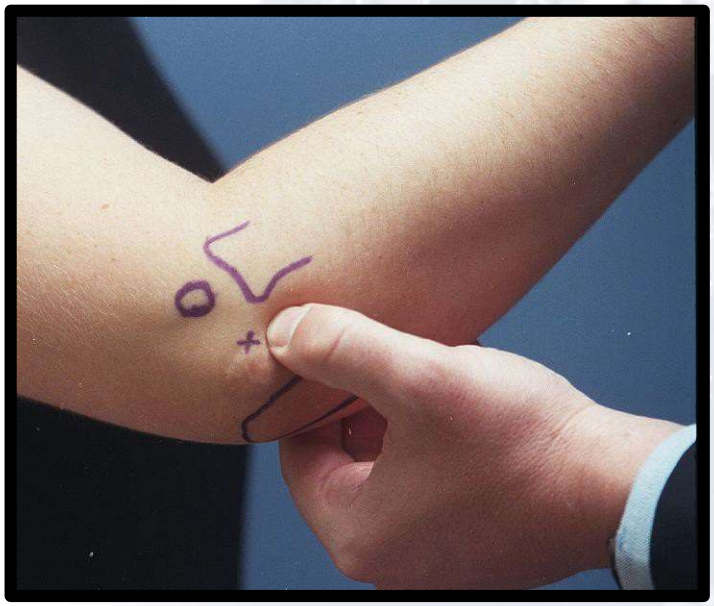
- Medial epicondyle

Palpate in flexion to move flexor-pronator mass anteriorly

PALPATION

POSTERIOR PALPATION

- Olecranon
- Medial Epicondyle

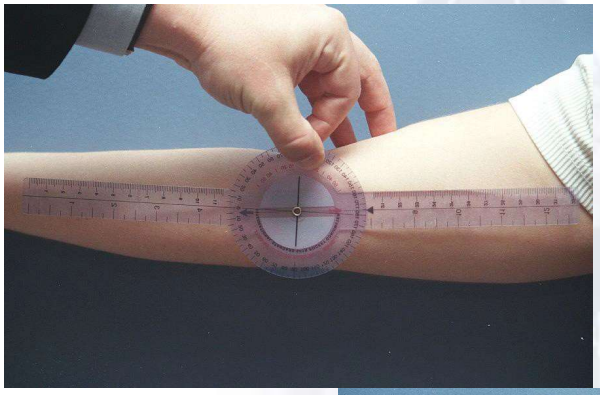


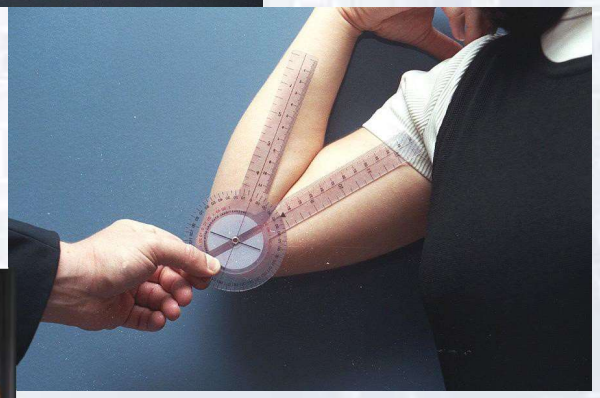
LATERAL PALPATION

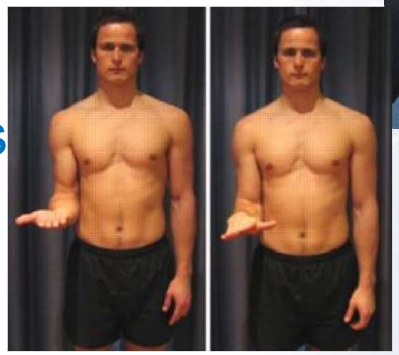
- Lateral epicondyle
- Radial Head
- Lateral olecranon
- Soft spot

RANGE OF MOTION

- Active followed by passive ROM
- Normal ROM in adult
  - 0 – 140 degrees +/- 10 degrees in sagittal plane
  - 80-90 degrees of forearm rotation in each direction
- With progressive extension, elbow moves into increasing valgus







STRENGTH TESTING

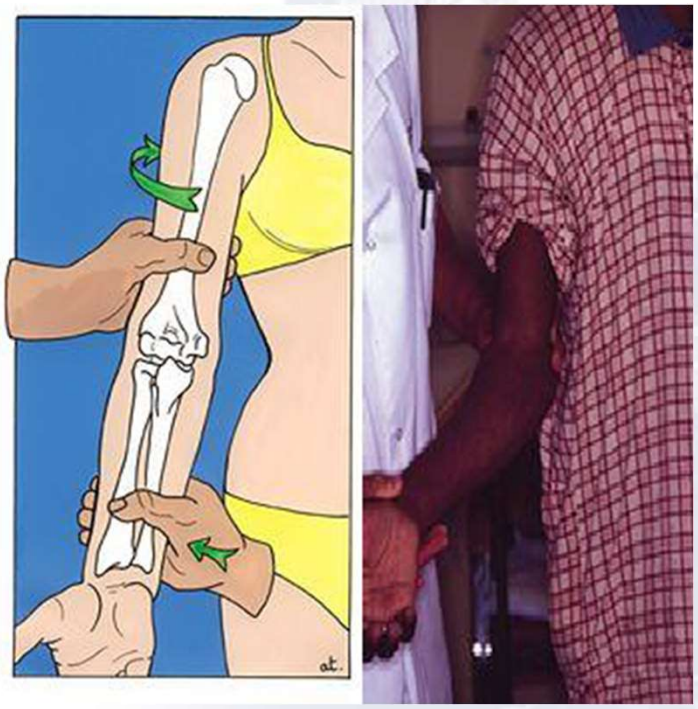
- Resisted forearm flexion/extension
- Resisted wrist extension/flexion
- Resisted long finger extension
- Pain at elbow with resisted forearm/wrist/finger extension -> may be lateral epicondylitis
- Pain at elbow with resisted forearm/wrist flexion -> may be medial epicondylitis

DIFFERENTIAL DIAGNOSIS OF ELBOW PAIN

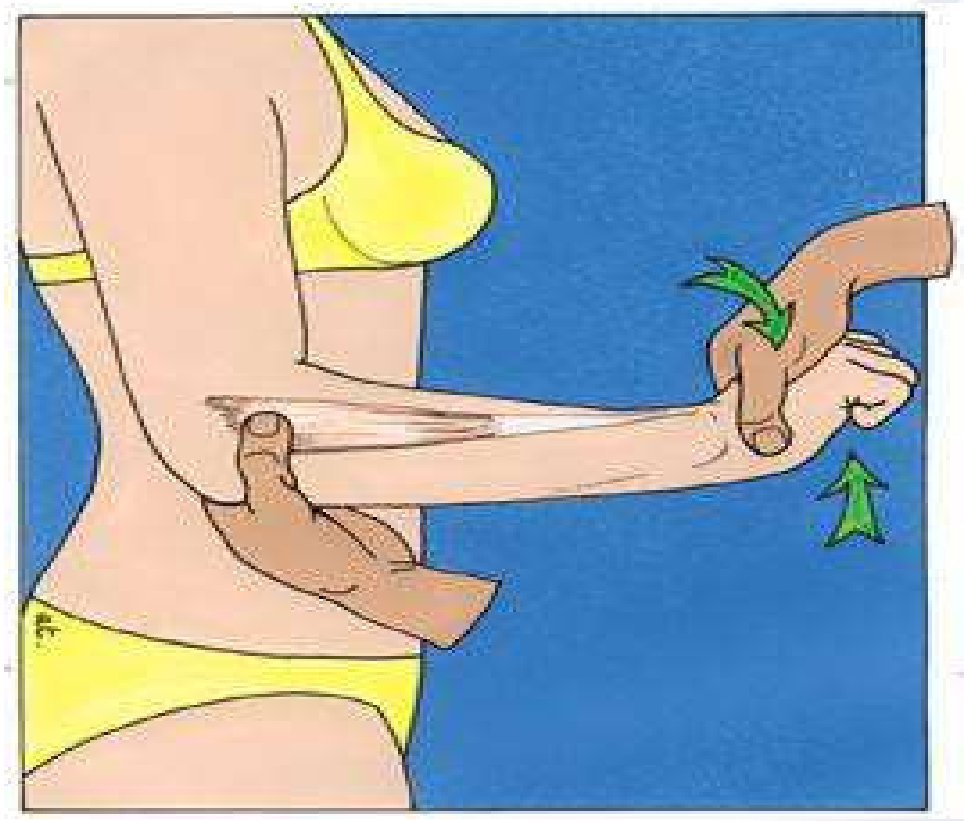
ANTERIOR	MEDIAL
Anterior capsule strain	Cubital tunnel syndrome
Biceps tendinopathy	Medial epicondylitis
Gout	Ulnar collateral ligament injury
Intra-articular loose body	Valgus extension overload syndrome
Pronator syndrome	POSTERIOR
Osteoarthritis	Olecranon bursitis
Rheumatoid arthritis	Olecranon stress fracture
LATERAL	Osteoarthritis
Lateral epicondylitis	Posterior impingement
OCD	Triceps tendinopathr
Plica	
Posterolateral rotatory instability	
Radial tunnel syndrome/Posterior interosseous nerve	

SPECIAL TESTS

- Rupture of Ulnar Collateral Ligament (rare)
  - UCL is on the medial aspect of the elbow
  - Valgus stress – arm in partial extension, stress on the lateral aspect of the elbow, opens up the medial joint space -> pain may indicate rupture

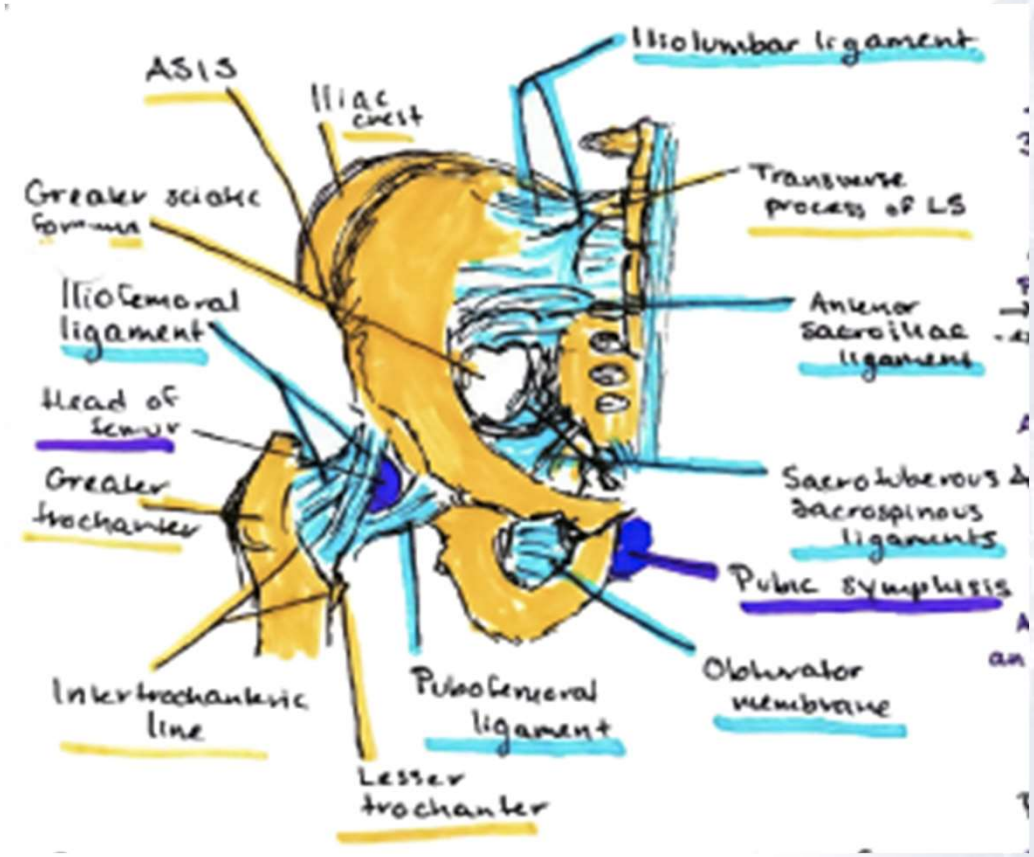


TENNIS ELBOW TEST



TINELS SIGN FOR ULNAR NERVE

Hip Evaluation

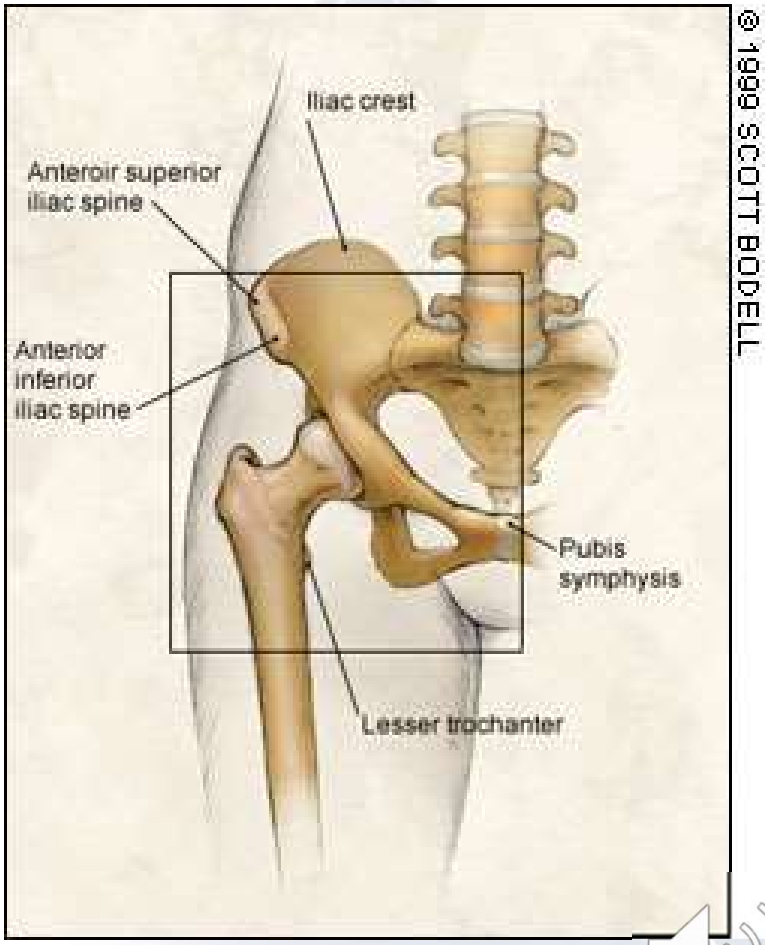


Common Hip Problems by Age

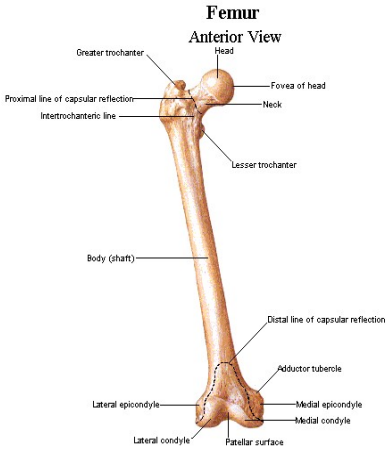
- Newborn
  - Congenital dislocation of hip
- Age 2-8
  - AVN of hip (Legg-Calve-Perthes), synovitis
- Age10-14
  - Slipped Cap Fem Epiphysis
- Age 14-25
  - Stress Fracture
- Age 20-40
  - Labral Tear
- Age >40
  - Osteoarthritis

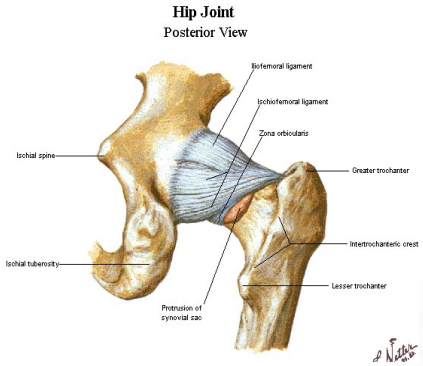
Anatomy

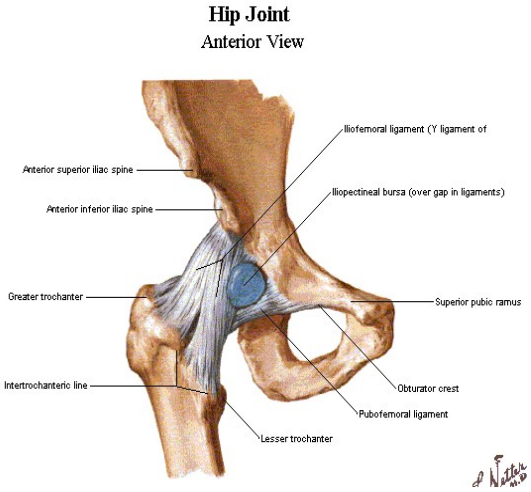
- Bones
  - Pelvis
    - Ilium
    - Ischium
    - Pubis
    - Sacrum
  - Femur

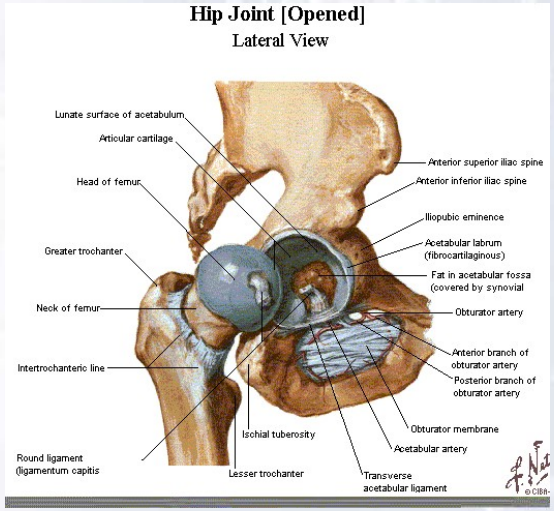


Anatomy


Femur
Anterior View
Greater trochanter
Head
Fovea of head
Proximal line of capsular reflection
Neck
Intertrochanteric line
Lesser trochanter
Body (shaft)
Distal line of capsular reflection
Adductor tubercle
Lateral epicondyle
Medial epicondyle
Medial condyle
Lateral condyle
Patellar surface

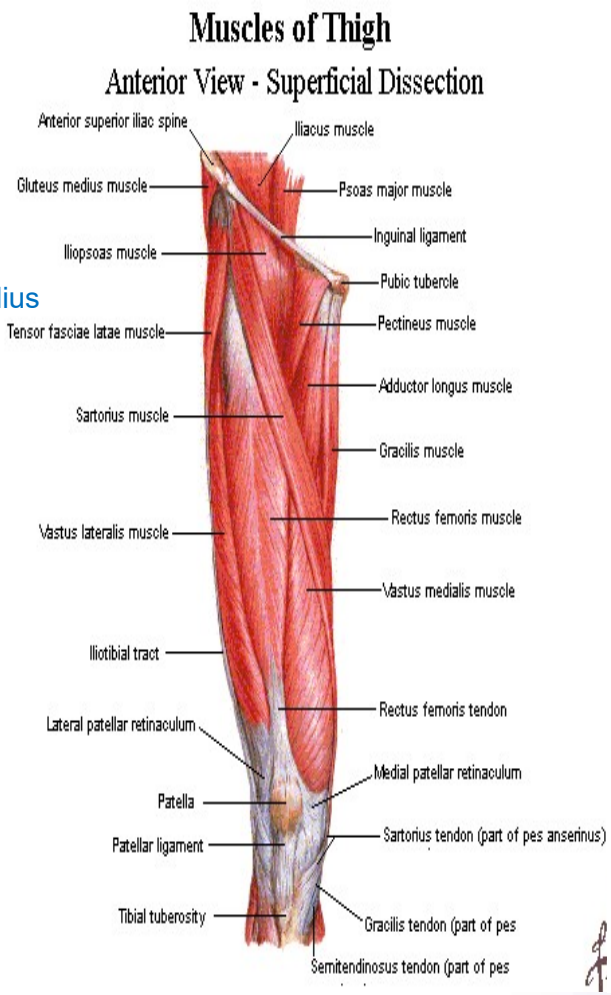

Hip Joint
Posterior View
Iliofemoral ligament
Ischiofemoral ligament
Zona orbicularis
Ischial spine
Greater trochanter
Intertrochanteric crest
Ischial tuberosity
Lesser trochanter
Protrusion of synovial sac

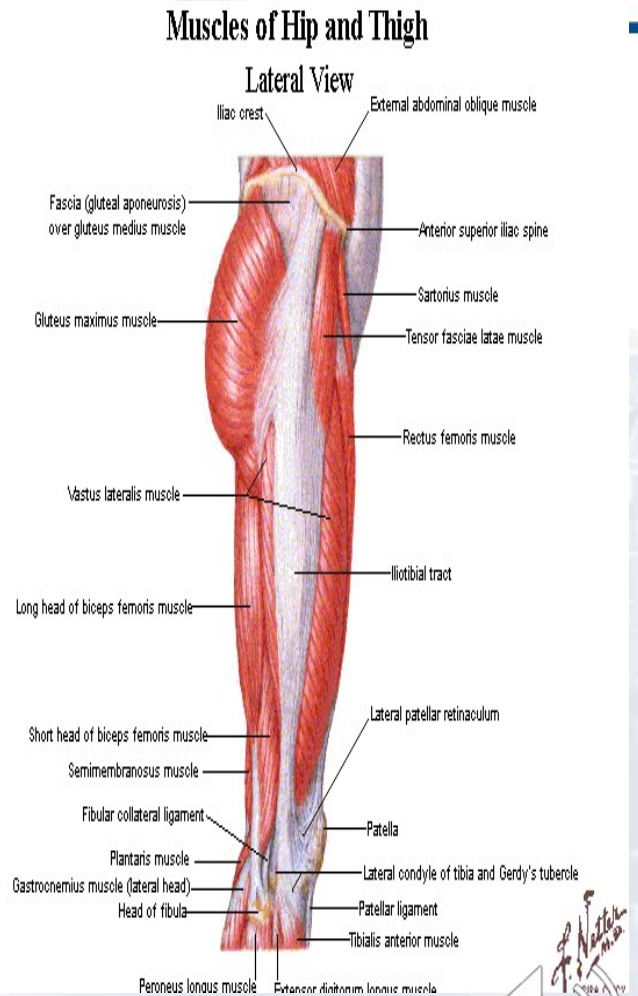

Hip Joint
Anterior View
Iliofemoral ligament (Y ligament of
Anterior superior iliac spine
Iliopectineal bursa (over gap in ligaments)
Anterior inferior iliac spine
Greater trochanter
Superior pubic ramus
Intertrochanteric line
Obturator crest
Pubofemoral ligament
Lesser trochanter


Hip Joint [Opened]
Lateral View
Lunate surface of acetabulum
Articular cartilage
Anterior superior iliac spine
Anterior inferior iliac spine
Head of femur
Iliopubic eminence
Acetabular labrum (fibrocartilaginous)
Greater trochanter
Fat in acetabular fossa (covered by synovial
Neck of femur
Obturator artery
Anterior branch of obturator artery
Intertrochanteric line
Posterior branch of obturator artery
Obturator membrane
Ischial tuberosity
Acetabular artery
Round ligament (ligamentum capitis
Lesser trochanter
Transverse acetabular ligament

Anatomy

- Anterior
  - Iliopsoas
  - Quadriceps
    - Vastus Medialis
    - Vastus Intermedius
    - Vastus Lateralis
    - Rectus Femoris
  - Sartorius
- Medial
  - Adductor Magnus
  - Adductor Longus
  - Adductor Brevis
  - Gracilis
- Posterolateral
  - Piriformis
  - Gluteus Maximus
  - Gluteus Medius
  - Gluteus Minimus
  - Tensor Fascia Lata
    - Iliotibial Band





Hip Pathology

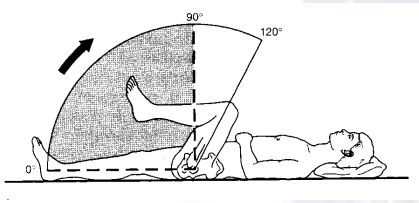
- Snapping Hip
  - Iliopsoas
  - Iliotibial Band
- Trochanter
  - Trochanteric Bursitis
  - Gluteal Tendons
- Athletic Pubalgia
  - Sports Hernia
  - Direct Hernia
  - Indirect Hernia
- Hip Osteoarthritis
- Iliopsoas Bursitis
- Iliopectineal Bursitis
- Femoroacetabular Impingement
- Acetabular Labral Tear
- Adductor
  - Strain
  - Tear
- Quadriceps
  - Strain
  - Tear
- Hamstrings
  - Strain
  - Tear
- Ischial Bursitis

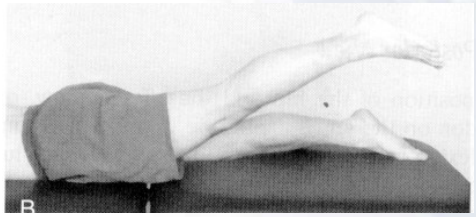
Hip Pain

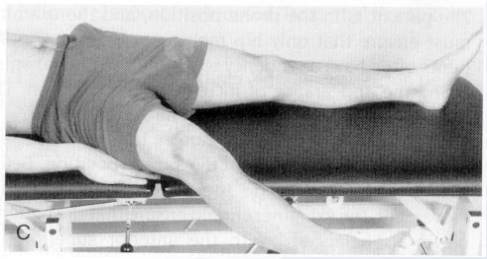
- Anterior Differential Dx
  - Osteoarthritis
  - Inflammatory arthritis
  - Muscle and tendon strains
  - Tendonitis
  - Femoral neck stress fracture
  - Sports hernia (Occult hernia or tear of oblique aponeurosis)
  - Obturator or ilioinguinal nerve entrapment
  - Osteitis pubis
  - Acetabular labral tears
- Posterior Differential Dx
  - Lumbar spine disease
    - Degenerative disc disease
    - Facet arthropathy
    - Spinal stenosis
  - Sacroiliac joint disorders
  - Hip extensor and external rotator muscle pathology
    - Piriformis Syndrome
  - Aortoiliac vascular occlusive disease (rare)
- Lateral Hip Differential Dx
  - Greater trochanteric pain syndrome
  - Iliotibial band syndrome
  - Meralgia paresthetica

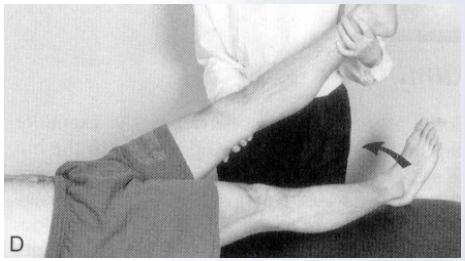
Range of Motion

- Flexion: 110 to 120 degrees
- Extension: 10 to 15 degrees
- Abduction: 30 to 50 degrees
- Adduction: 30 degrees



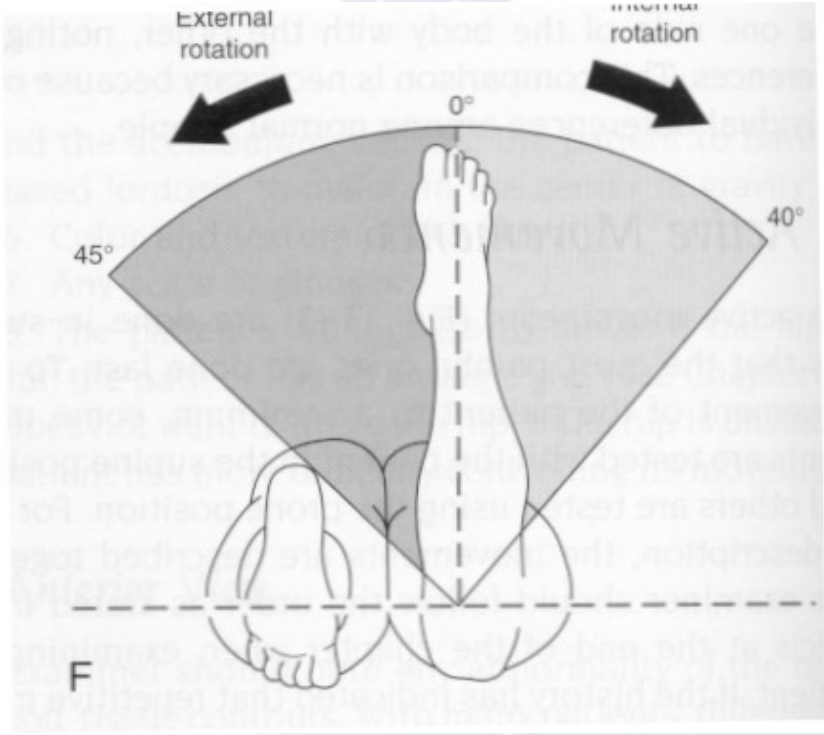






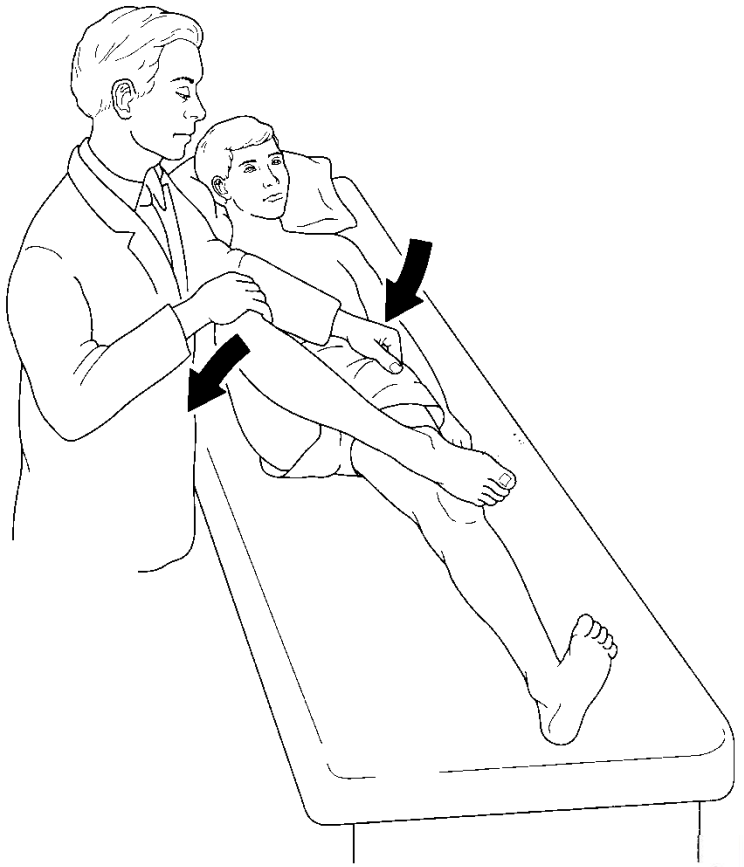
Range of Motion

- External rotation: 40 to 60 degrees
- Internal rotation: 30 to 40 degrees



Special Tests

- **Patrick's Test** (FABER)
  - hip joint
  - SI joint

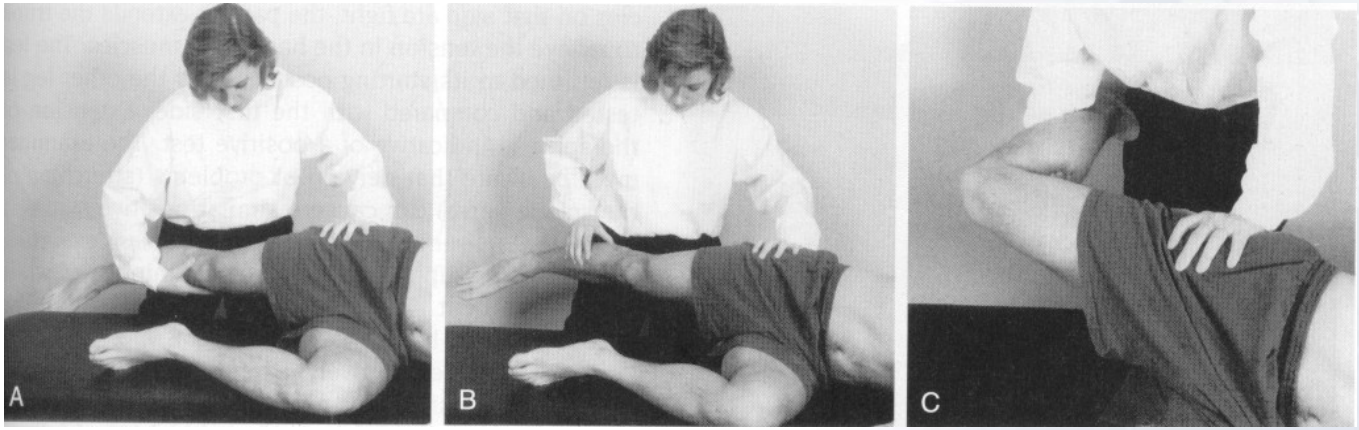


Special Tests

- **Labral Injury**
  - FADIR:
  - Flexion, Adduction, Internal Rotation
    - Axial Loading
    - pain +/- click

Special Tests

- Ober Test
  - iliotibial band flexibility



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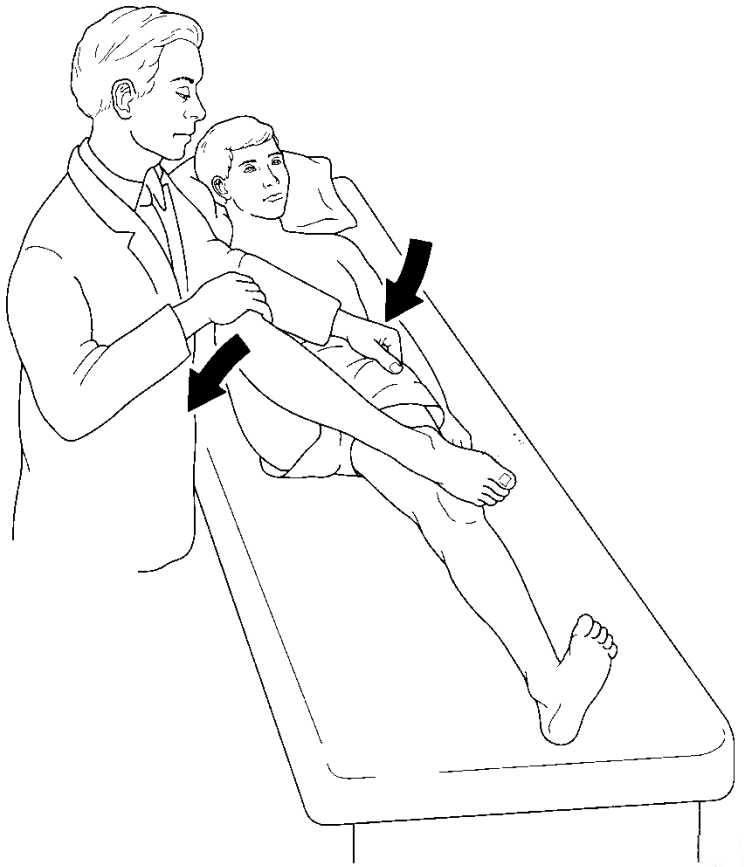
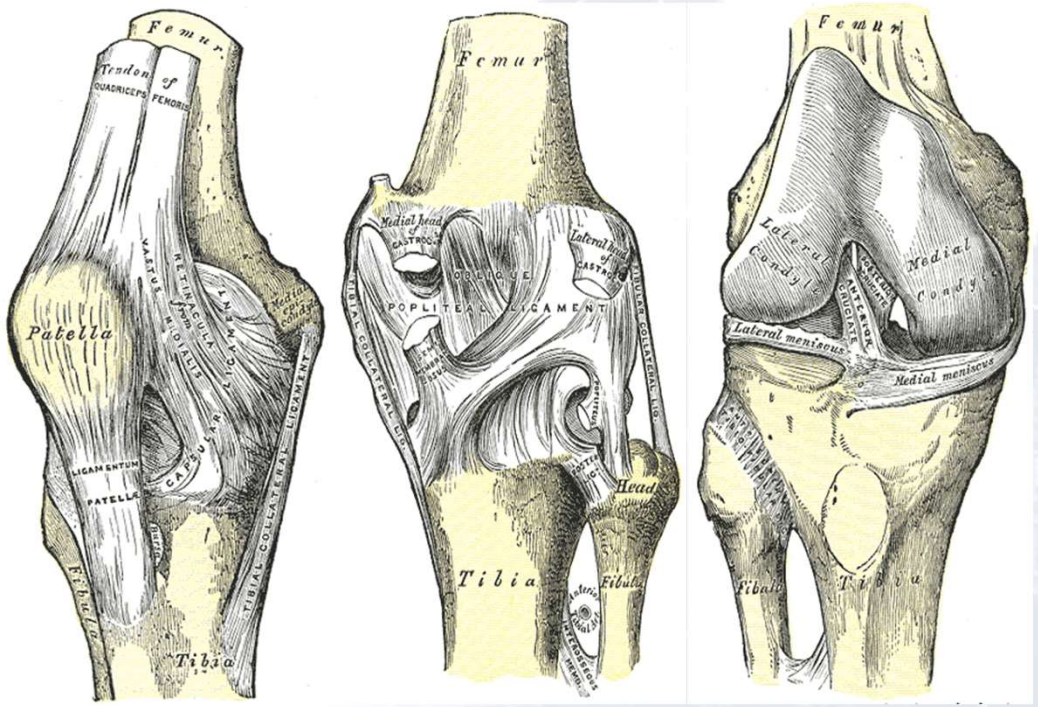


Knee Exam

General Ortho Physical Exam Maneuvers

- Inspection
- Palpation
- Range of Motion
- Stability
- Special Tests
- Always think about the joint above and below where the pain is and examine that joint



INSPECTION

- Look for redness, swelling, warmth -> think septic arthritis
- Look for effusion – occurs in acute injury
  - Is the effusion mild, moderate, or severe?
- Look for displacement of the patella
- Baker's cyst – swelling over posterior aspect of the knee
- Don't forget to watch the patient walk
  - Is the patient able to bear weight?
  - Does the patient have an antalgic gait? (limping gait) Indicates pain with weight bearing

PALPATION

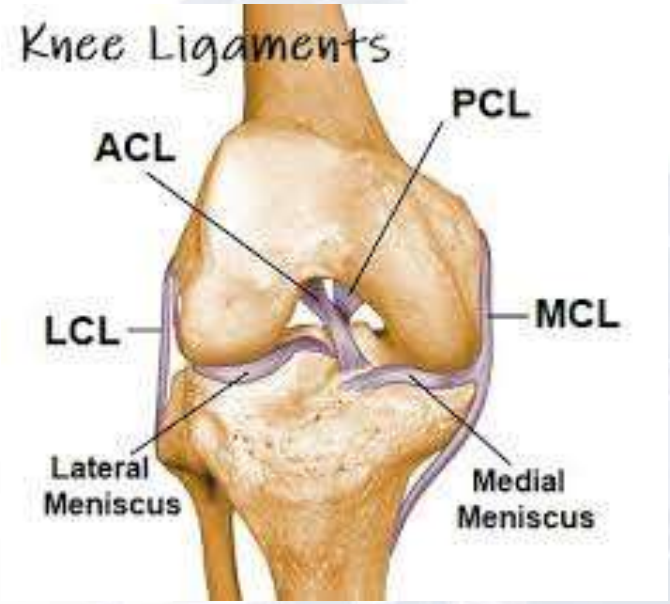
- Grasp the lower extremity just distal to the knee and push upward, attempting to “milk” any effusion that may be present
  - If there is a significant effusion, you will see it fill the crevices on the medial and lateral sides of the patella
- Palpate the patella – should be mobile, easy translation
- Palpate the entire knee, looking for any point tenderness
  - Evaluate joint line tenderness with the thumb

RANGE OF MOTION

- Normal functional ROM
  - 3 degrees of hyperextension
  - 140 degrees of flexion
- Always compare the symptomatic knee to the contralateral normal knee
- Forced flexion
  - Patient with a meniscal tear will be unable to tolerate
- Limited extension – consider meniscal tear or effusion
- Hyperextension – consider PCL tear

Ligament & Meniscal Examination Stability

- Lachman
  - Evaluates for ACL injury
- Posterior drawer
  - Evaluates for PCL injury
- Varus and valgus stress
  - Evaluates for MCL, LCL injuries
- McMurray
  - Evaluates for meniscal injury



Lachman

- With the knee flexed at 30 degrees, grasp the inner aspect of the calf with one hand, grasp outer aspect of distal thigh with the other hand
- Pull on the tibia to assess the amount of anterior motion of the tibia in comparison to the femur
- ACL injury – increased forward translation of the tibia at the end of movement

Posterior Drawer

- With the knee flexed to 90 degrees and the patient's foot flat on the table, grasp the tibia with both hands and push posteriorly
- Laxity at the conclusion of movement is indicative of a PCL injury

Varus and Valgus Stress

- Place the patient's leg over the examination table with one hand over the lateral joint line and the other hand holding the distal portion of the extremity
- Flex the knee to 30 degrees and apply a varus force (adduction), then apply a valgus force (abduction)
- Laxity with varus stress indicates LCL injury
- Laxity with valgus stress indicates MCL injury

McMurray

- With the knee flexed to 90 degrees, place one hand along the lateral joint line and grasp the foot with the other hand
- Provide a varus stress on the knee
- Rotate the leg externally and extend the knee
- If the patient experiences pain or a click is felt with the motion, a medial meniscal injury should be suspected
- A lateral meniscal injury can be evaluated with the same test by stabilizing the medial knee, internally rotating the leg and extending the knee

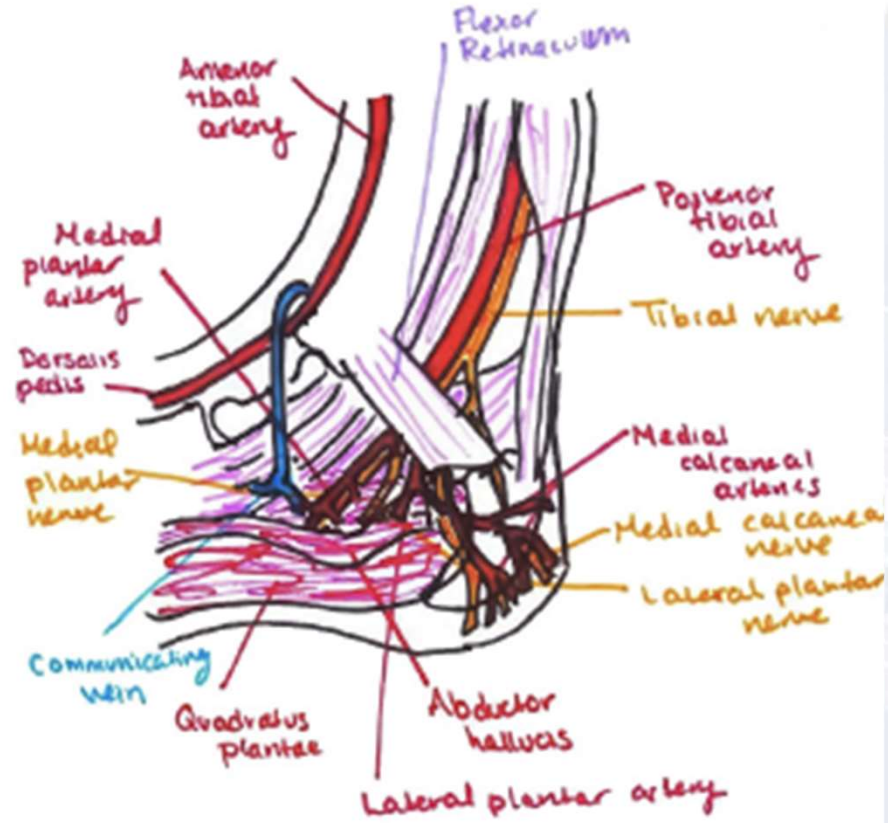
SPECIAL TESTS

- Patellar apprehension test
  - Manually subluxate the patella laterally
  - In a pateller tendon injury, the patient will not tolerate this test
- Patellar grind
  - Have the patient flex his quadricep, then apply a posteriorly-directed force to the patella
- Apley's test
  - With the patient prone, flex the affected knee to 90 degrees, grasp the foot and rotate the knee, applying a downward force
  - Reproduction of pain indicates a meniscal injury
- Duck walk
  - Have the patient attempt to walk while in a squatting position
  - If the patient is able to walk, he/she likely does not have a meniscal injury

Apley's test

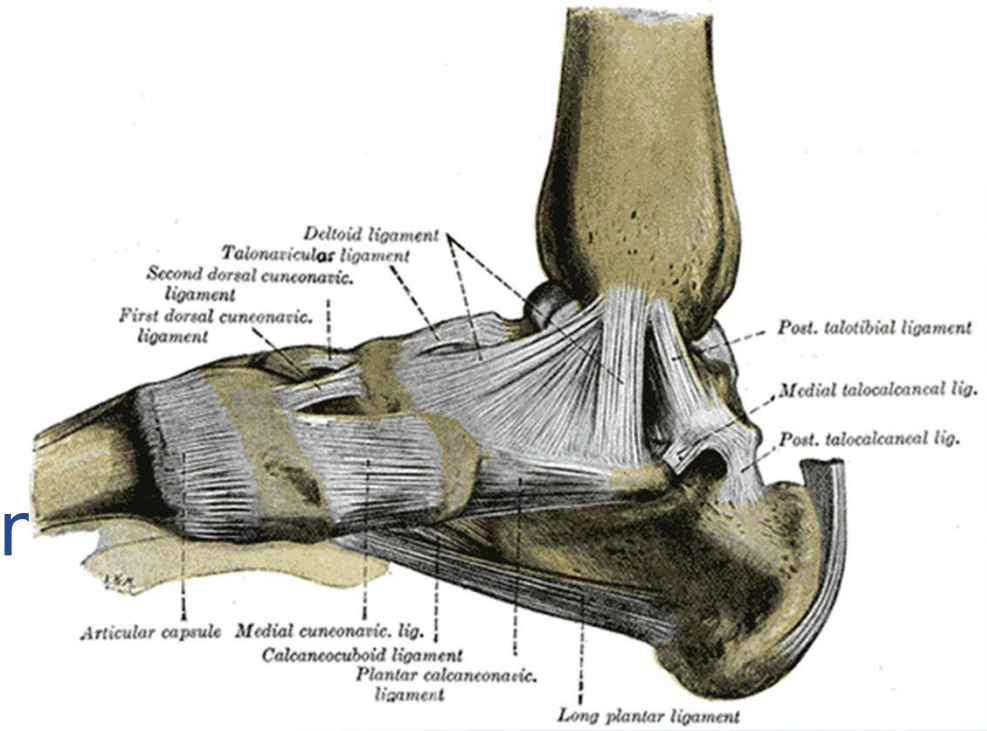
Duck walk

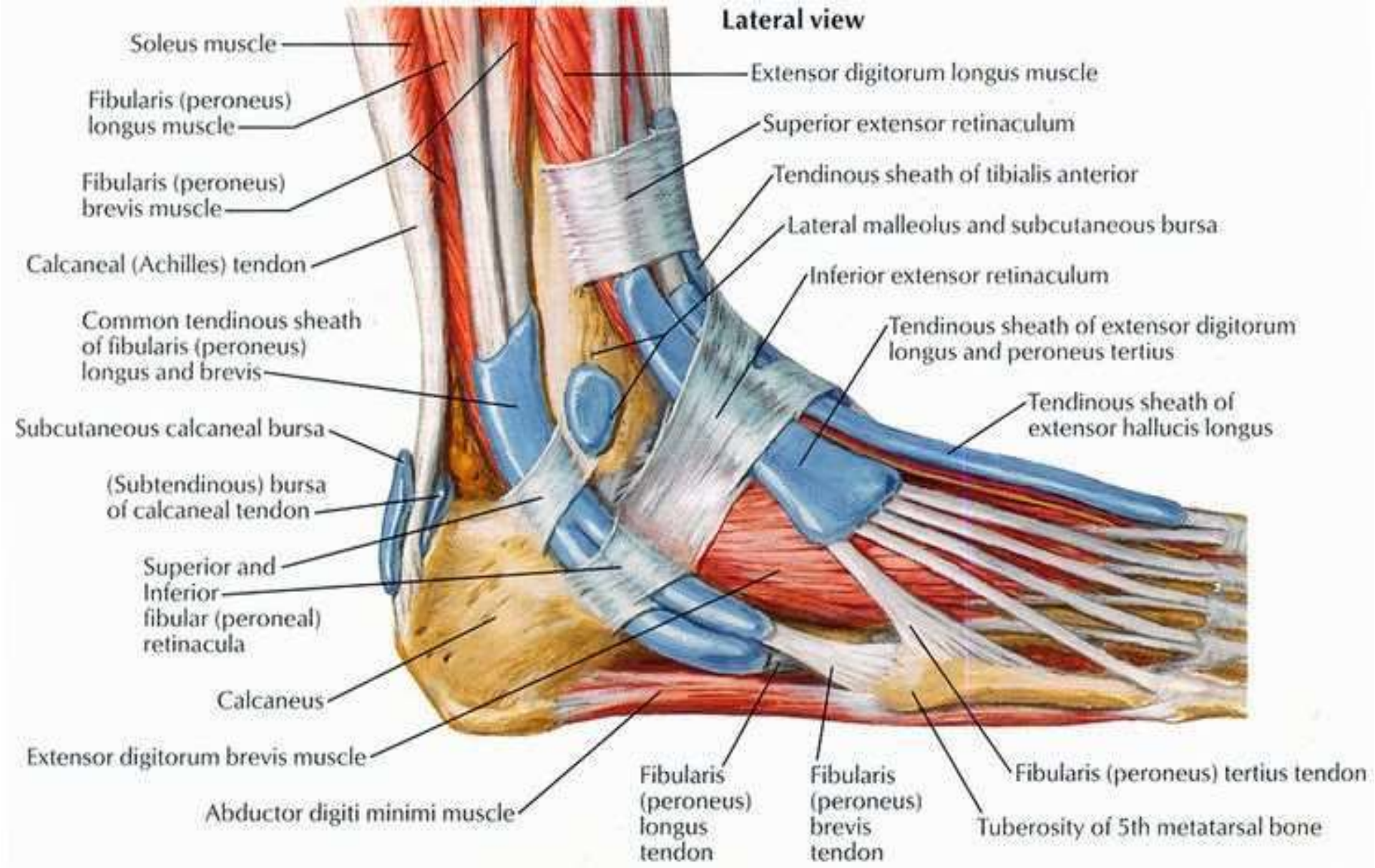
ANKLE


Flexor Retinaculum
Anterior tibial artery
Posterior tibial artery
Medial plantar artery
Tibial nerve
Dorsalis pedis
Medial plantar nerve
Medial calcaneal arteries
Medial calcaneal nerve
Lateral plantar nerve
Communicating vein
Quadratus plantae
Abductor hallucis
Lateral plantar artery

General Ortho Physical Exam Maneuvers

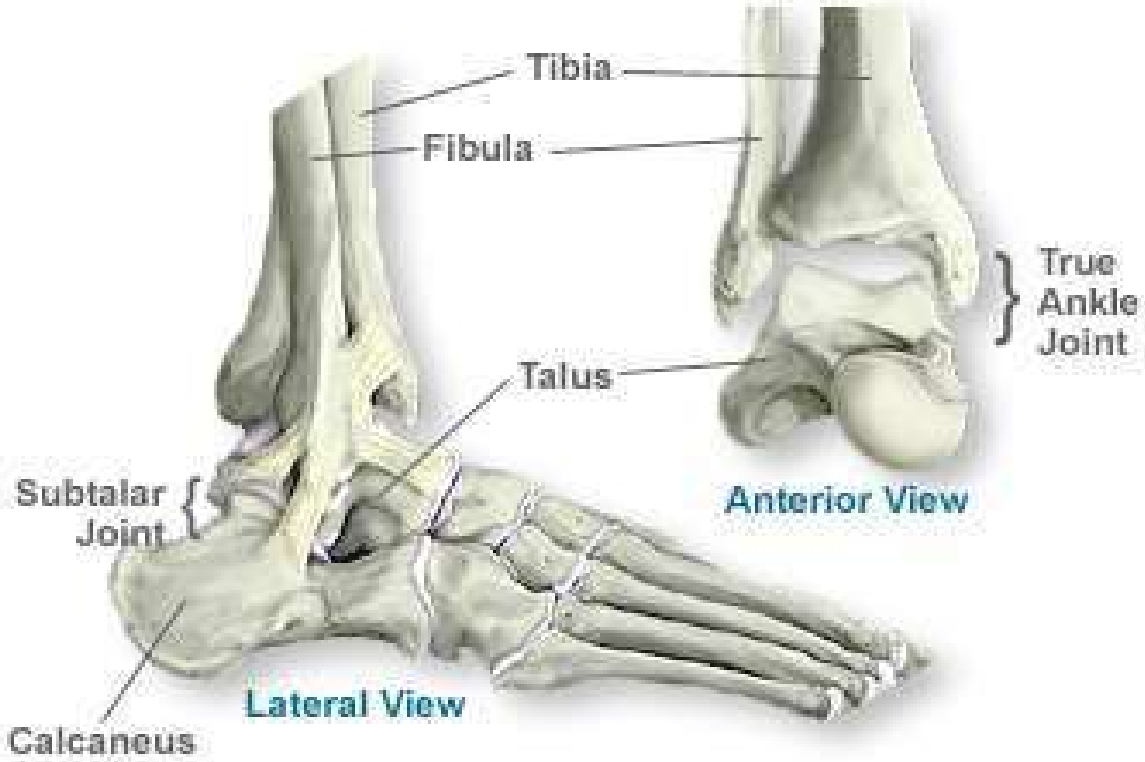
- Inspection
- Palpation
- Range of Motion
- Muscle Strength
- Special Tests
- Always think about the joint above and below where the pair is and examine that joint



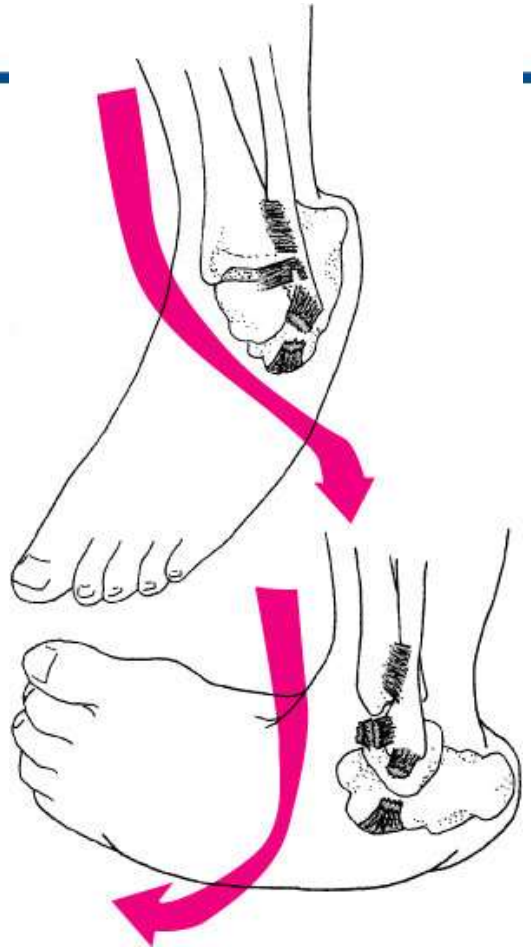


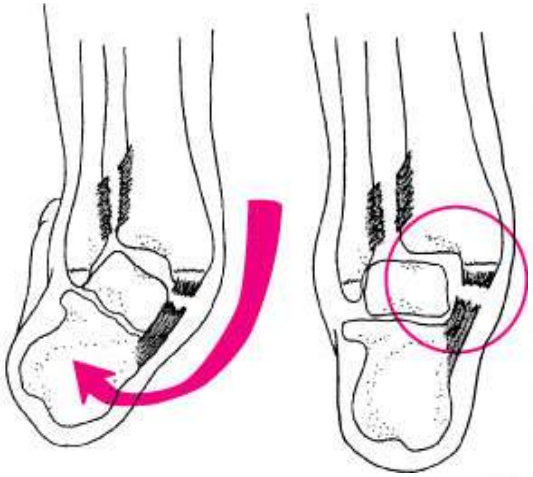
A large number of bones, ligaments, muscles, and tendons work in concert to provide stability and flexibility

Ankle joint


Tibia
Fibula
True Ankle Joint
Talus
Subtalar Joint
Anterior View
Lateral View
Calcaneus

History





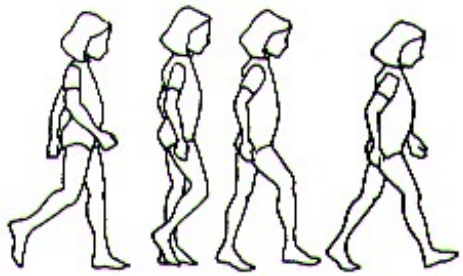
- Mechanism of injury?
  - Position of foot & ankle at time of injury
  - Plantarflexion / Dorsiflexion
  - Inversion / Eversion
  - External rotation / Internal rotation
  - Pop or snap?

History

- Swelling? How soon?
- Where's the pain?
- Degree of dysfunction
  - Able to bear weight?
  - Finished game?
- Prior injury to foot / ankle?
  - Rehabilitation?
- Occupation, sporting activities
- History is often vague

Physical Exam - Observation

- Inspection / Observation
  - Obvious deformity?
  - Ecchymosis?
  - Swelling?
  - Gait?



Physical Exam - Palpation

- Palpation (Lateral)
  - Lateral malleolus
  - Lateral ligaments
    - ATFL, CFL, PTFL
  - Peroneal tendons
  - Base of 5th MT
  - Cuboid
  - Proximal fibula

Physical Exam - Palpation

- Palpation (Medial)
  - Medial malleolus
  - Medial (Deltoid) ligaments
  - Tarsal tunnel contents
    - PT, FDL, FHL, Tibial nerve & artery
  - Mid-foot area

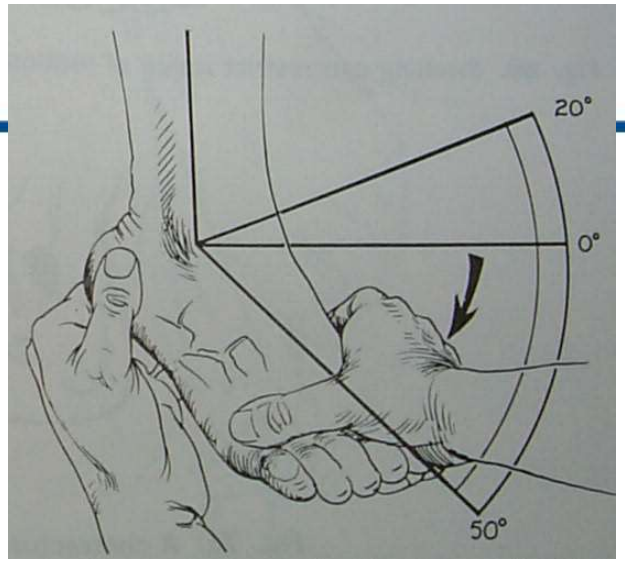
Physical Exam - Palpation

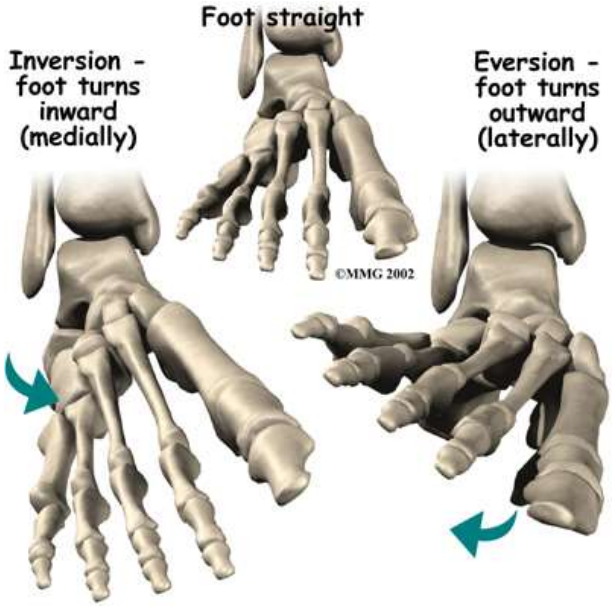
- Palpation (Anterior)
  - Anterior ligaments
    - TA, EHL, EDL
  - Anterior joint line
  - Cuboid
  - Mid-foot area
  - Neurovascular status

Physical Exam - Palpation

- Palpation (Posterior)
  - Achilles tendon
  - Retrocalcaneal bursa

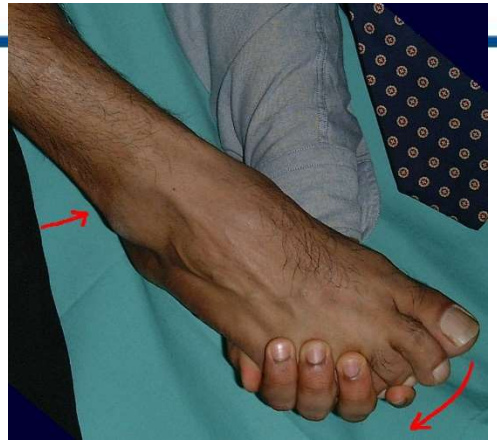
Physical Exam - Range of Motion





- Dorsiflexion: 20º
- Plantar Flexion: 50º
- Inversion: 35º
- Eversion: 35º
- Forefoot adduction: 20º
- Forefoot abduction: 10º

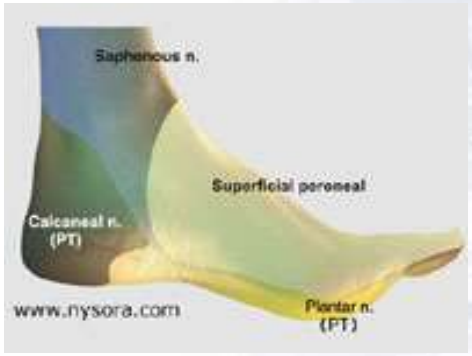
Physical Exam - Motor



- Tibialis Anterior
  - L4, Deep Peroneal nerve
- EHL
  - L5, Deep Peroneal nerve
- Gastroc-Soleus
  - S1/S2, Tibial nerve
- Peroneals
  - S1, Superficial Peroneal nerve
- Tibialis Posterior
  - L5, Tibial nerve

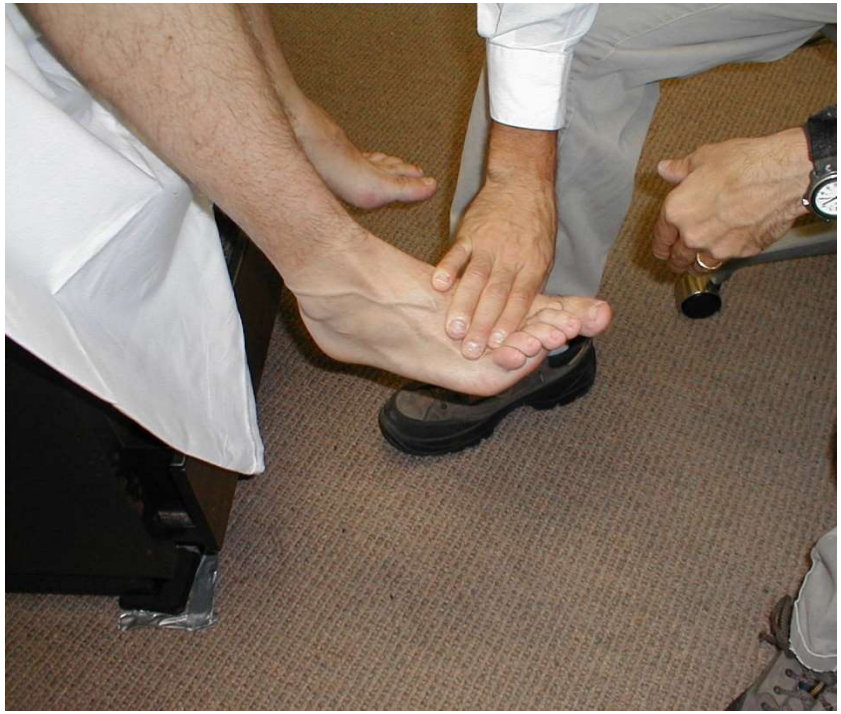
Physical Exam - Sensory

- Medial Foot
  - L4, Long Saphenous nerve
- Dorsal Foot
  - L5, Superfical Peroneal nerve
- Lateral foot
  - S1, Sural nerve
- 1st Web space
  - Deep Peroneal nerve



JOHNS HOPKINS MEDICINE

Physical Exam - Special Tests



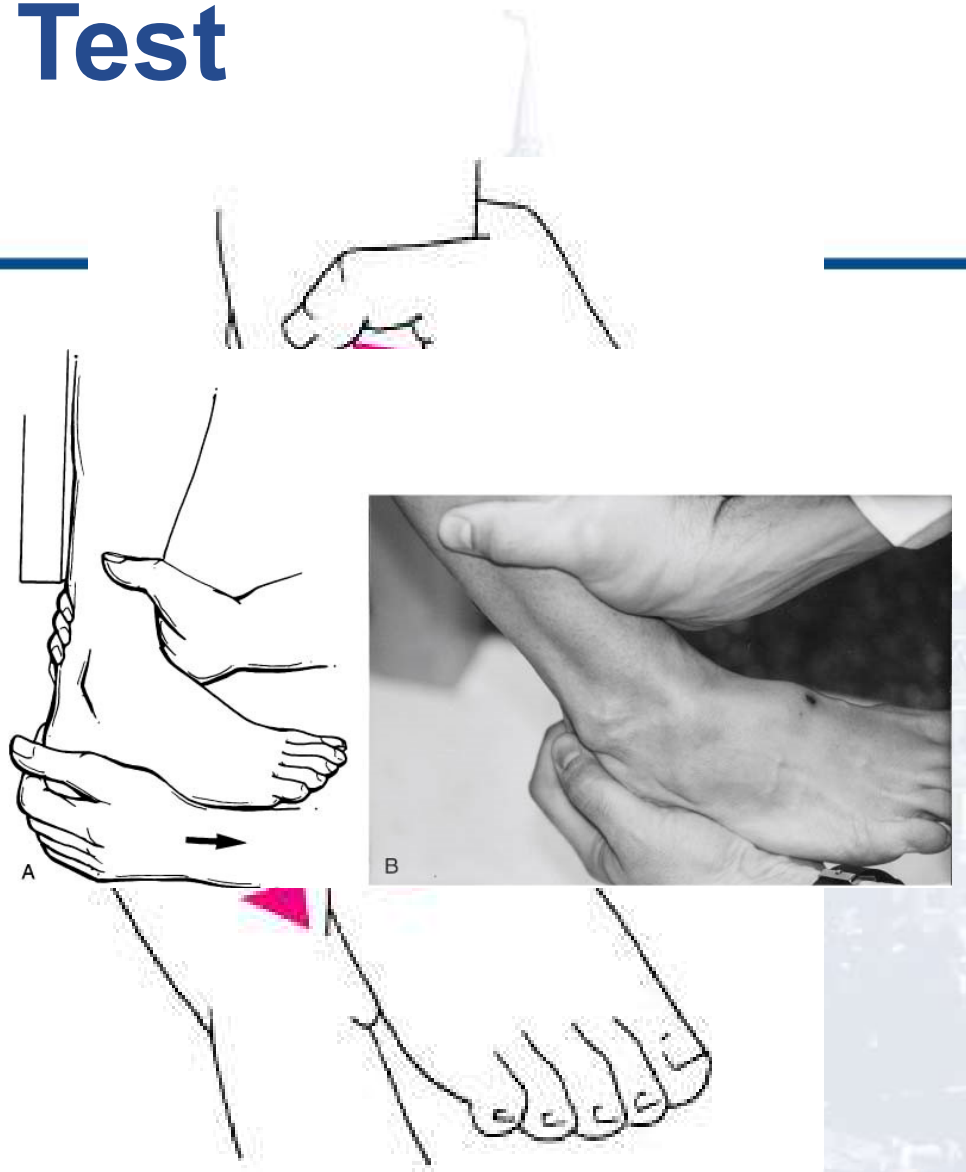
- Thompson test
- Anterior drawer
- Talar tilt
- Reverse talar tilt
- Squeeze test
- Kleiger's test

Thompson Test

- Tests integrity of the Achilles tendon
- Patient prone with foot extended off table
- Squeeze calf
- Positive test: no movement in the foot

Anterior Drawer Test

- Tests integrity of ATFL
- Foot in neutral / slightly plantarflexed positions
- A few millimeters of translation is normal
- Compare to contralateral side
- Positive:
  - “Suction Sign:” dimple in anterolateral ankle
  - Audible / palpable clunk
  - Laxity, soft endpoint



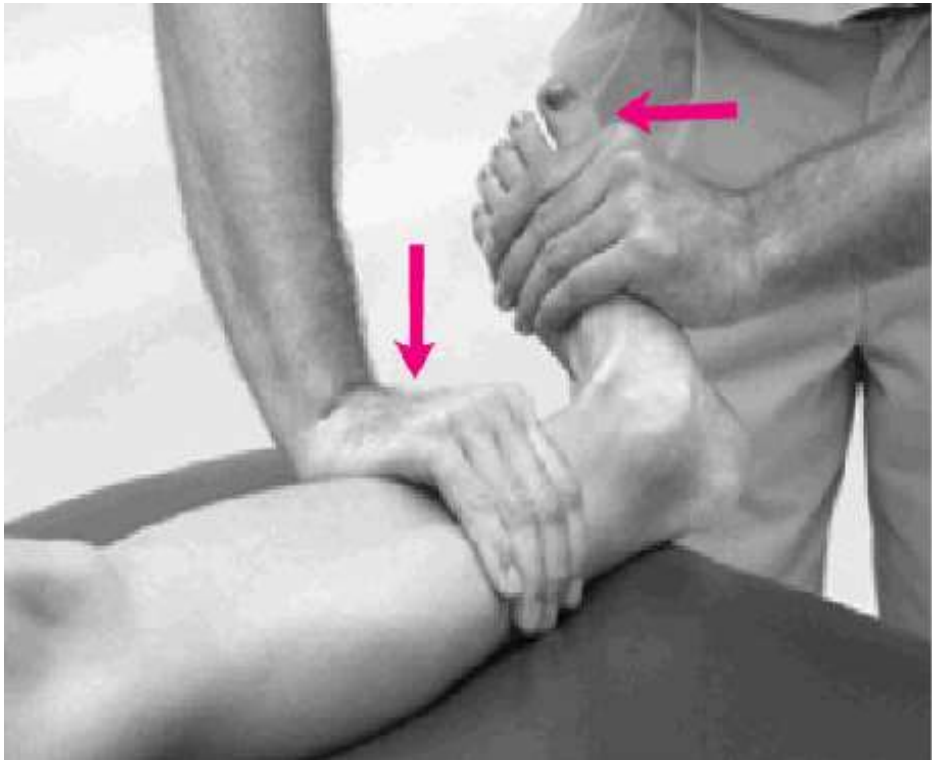
Talar Tilt

- Tests integrity of CFL (> ATFL)
- Performed with foot neutral / plantarflexed
  - Neutral → CFL
  - Plantarflexed → + ATFL
- Apply varus stress
- Compare to contralateral side

Tibia-Fibula Squeeze (Compression) Test

- Tests integrity of syndesmosis & distal tib-fib joint
- Compress tibia & fibula together
- Positive:
  - Pain at anterior-inferior aspect of ankle

External Rotation (Cotton; Kleiger's) Test



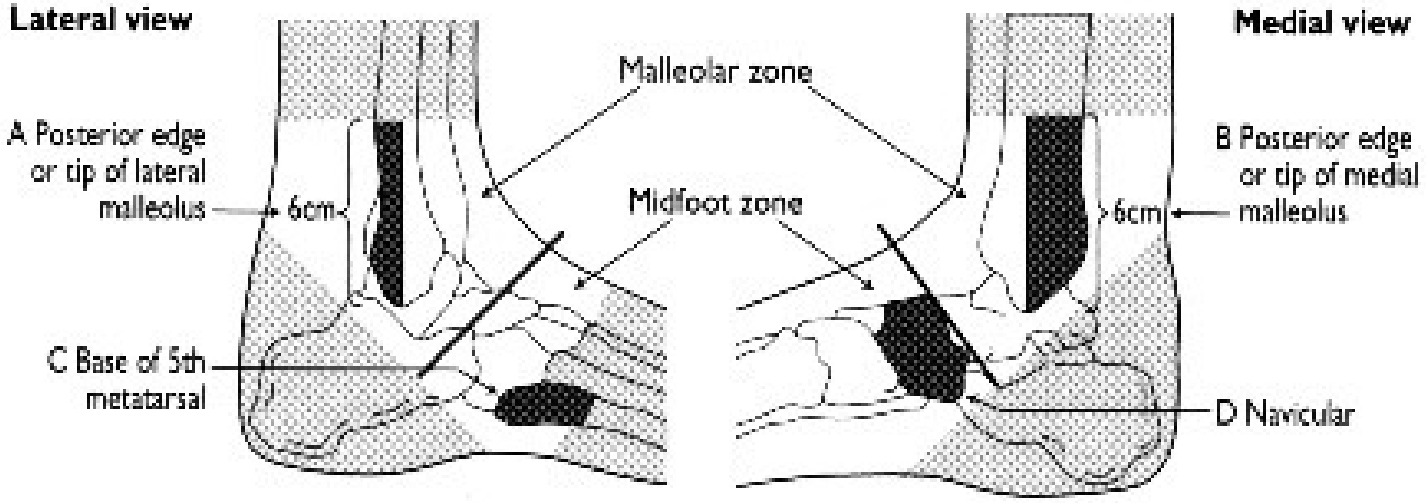
- Stresses Deltoid ligament
- Tests integrity of syndesmosis
- Stabilize lower leg stabilized, & externally rotate foot
- Positive:
  - Pain over anterior or medial ankle suggests syndesmotic injury

Physical Exam - Functional Tests

- If able to weight bearing, test as tolerated
  - Walk on toes (plantar flexion)
  - Walk on heels (dorsiflexion)
  - Walk on lateral borders of feet (inversion)
  - Walk on medial borders of feet (eversion)
  - Progressive hopping trial
- Aids in Return-to-Play decisions

Indications for Ankle X-Rays

- Ottawa Ankle Rules
  - Age 55 years or older



An ankle *x* ray series is required only if there is any pain in malleolar zone and any of these findings:

- Bone tenderness at A
- Bone tenderness at B
- Inability to bear weight both immediately and in emergency department

A foot *x* ray series is required only if there is any pain in midfoot zone and any of these findings

- Bone tenderness at C
- Bone tenderness at D
- Inability to bear weight both immediately and in emergency department

Indications for Ankle Radiographs

- Other indications
  - The patient cannot communicate (altered mental status, alcohol intoxication, or other)
  - Pain and swelling do not resolve within 7-10 days after injury
  - Anytime your history and physical don't give you enough information

Normal ankle
(AP view)

Normal ankle
(Mortise view)

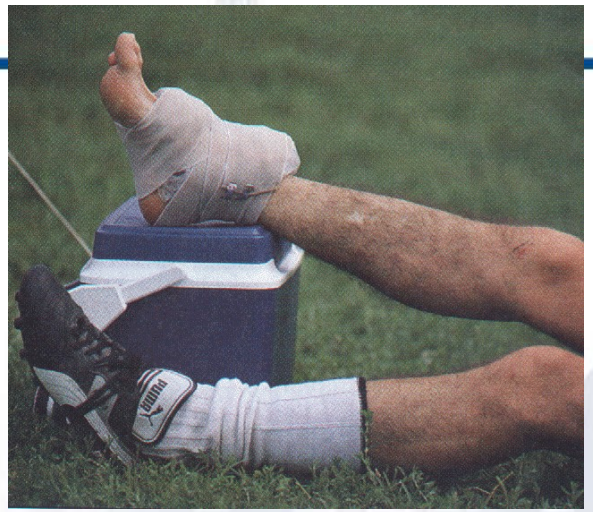
Normal ankle
(Lateral view)

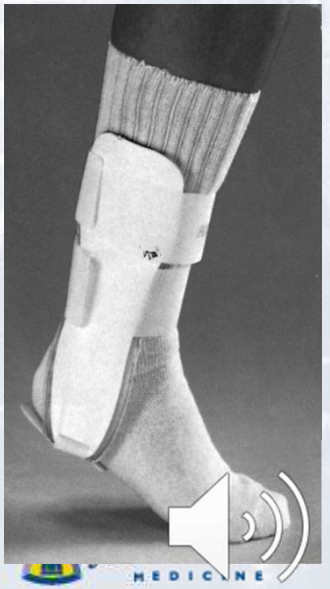
When to Cast or Immobilize?

- Fracture
  - Avulsion or SH
- ? Grade III sprain
- Inability to bear weight with negative films
- Syndesmotic injury

Treatment – Phase I: Acute

- PRICEM
  - Protection
    - Stirrup splint
    - Walking cast / boot
    - Crutches if unable to bear weight due to pain
  - Relative rest
  - Ice
    - 20 min every 2-3 hrs for first 48-72 hrs
  - Compression
  - Elevation
    - Control swelling
  - Meds
    - Pain management
- Physical Therapy





Thank You