

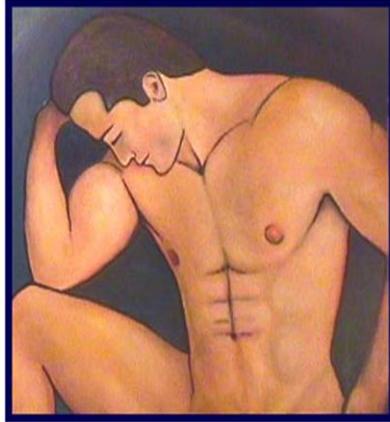
# Musculoskeletal Assessment Upper and Lower limb



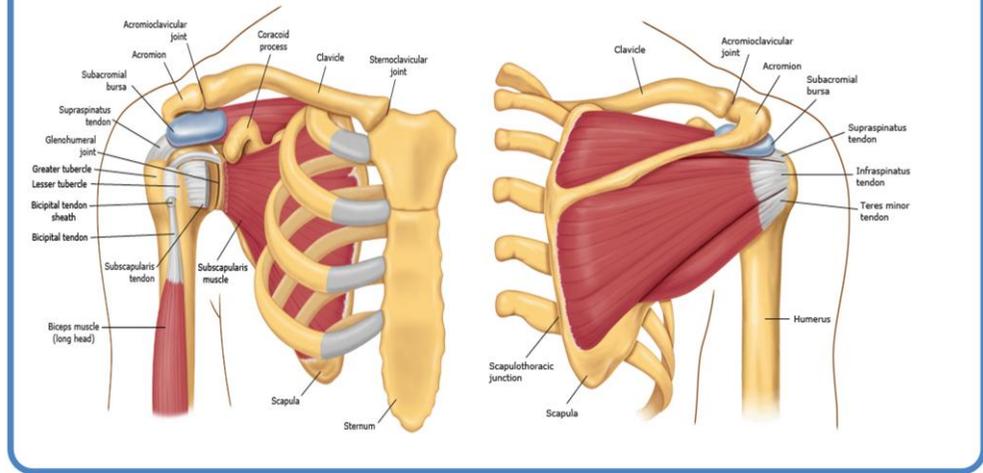
## **Presentation format consists of:**

- Focused review of anatomy of upper & lower limbs
  - Bones            Muscles            Ligaments            Tendons
- Systematic approach to assessment including
  - Relevant history
  - Examination process: Look, Feel, Move
  - Pain assessment
- Checklist for limb examination
- Participant activity
- Pattern of injury

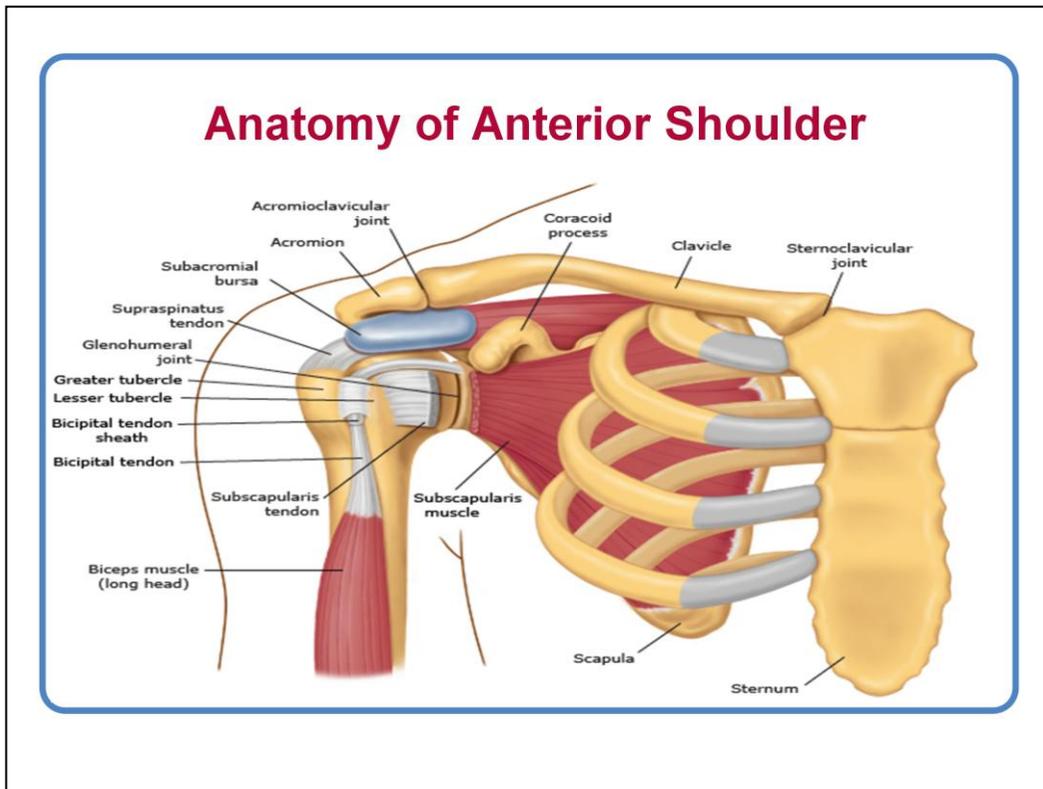
## Upper Limb Assessment



## The Shoulder



Discuss the anatomy of the shoulder, +/- view the limb assessment DVD - shoulder



**Bones**

*Scapula/Acromion/ AC joint/ coracoid/Glenoid/Clavicle*

*Humerus: Head, greater tuberosity, shaft*

**Muscles**

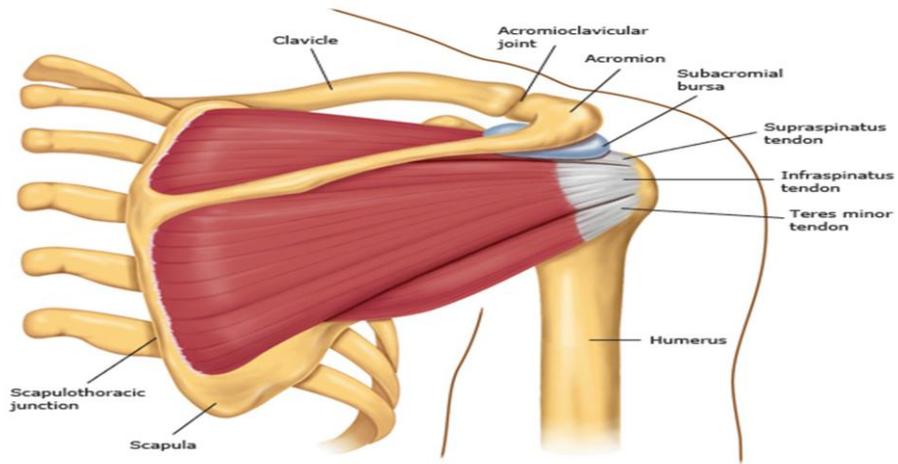
**Rotator Cuff -**

Very important in stabilising shoulder when lift arm up.

**Biceps tendon**

**Triceps (long head)**

## Anatomy of Posterior Shoulder



### Bones

*Scapula/Acromion/ AC joint/ coracoid/Glenoid/Clavicle*

*Humerus: Head, greater tuberosity, shaft*

### Muscles

**Rotator Cuff -**

Very important in stabilising shoulder when lift arm up.

**Biceps tendon**

**Triceps (long head)**

## Relevant History

- Trauma/atraumatic
- Previous dislocations
- Previous surgery
- Night pain
- Systemic Symptoms
- History of Arthritis
- Pain Assessment

Atraumatic pain, is a repetitive injury, is it referred pain?

## Examination process

- Look
- Feel
- Move
- Special Tests \*

**Whether you look feel move, or look move feel, it is imperative that the history and look are taken into account: Never undertake passive movement in a deformed / painful joint, never range a painful joint beyond what the patient can tolerate**

### **Move and Specialised Tests**

In the acute phase- never range a painful joint beyond what the patient can tolerate

-May distract or displace the fracture even further

-Might not be able to with dislocations of the glenohumeral joint

-Drop arm test (unable to hold arm abducted at 90 degrees) – positive for rotator cuff tear

-Pain > or approaching 90 degrees = impingement syndrome

### **Special tests:**

Painful arc = rotator cuff injury

Painful arc = pain 40-120 degrees abduction.

## **Examination: Look**

- Swelling
  - Difficult to see in shoulder as deep joint
  - Look for swelling in other structures
    - AC joint
    - Clavicle
- Deformity
- Wounds
- Colour (red or mottled)

## **Examination: Feel**

### ***Palpate***

- *Scapula/Glenoid/ Acromion/AC joint/ coracoid*
- *Clavicle*
- *Humerus: Head, greater tuberosity, shaft*
- *Muscles*

### ***Neurovascular assessment***

- *Axillary nerve (over deltoid area)*
- *Peripheral Pules*
- *Sensation to limb*

### **Neurovascular exam**

Axillary nerve

important in dislocation as nerve winds around neck of humerus and can be damaged

sensation in epaulet region PLUS feel deltoid working

Brachial/radial/ulnar arteries.

Skin tenting over clavicular # (critical skin)

## **Examination: Move**

- Flexion (0-170 degrees)
- Extension (0-45 degrees)
- Abduction (0-180 degrees)
- Adduction
- Internal Rotation (90 degrees)
- External Rotation (70 degrees)

Active movements (ie what the patient can do) only in acute trauma  
Don't passively range an acutely painful joint

## Checklist for shoulder exam

- Look/Range of motion
- Bones:
  - Scapula: spine/glenoid/coracoid/Acromion/AC joint
  - Clavicle
  - Humerus:
    - head/neck/greater tuberosity/shaft
- Neurovascular:
  - normal sensory and motor exam.
  - ALSO axillary nerve (deltoid `regimental badge sign).
  - Brachial/radial/ulnar arteries

Note

## **Activity**

- Review the musculoskeletal assessment of the shoulder on the DVD titled “
- Practice this assessment process on a colleague

## Patterns of Injury

- **Dislocation:**

- **Major complication: # of glenoid rim**
  - first traumatic.
  - multiple - can be atraumatic.
- **Anterior v posterior dislocation**
  - **Posterior dislocation**
    - 5% dislocations
    - caused by direct AP force
    - electric shock
  - **Inferior/subglenoid dislocation**
    - direct axial force
    - < 1% dislocations
    - hand fixed in abduction (up in the air!)

## Patterns of Injury

- **Rotator Cuff**

- night pain.
- pain on reaching up or undoing bra etc.
- NB if traumatic
  - avulsion of greater tuberosity of humerus is a possibility

- **Subacromial bursitis**

- repetitive injury

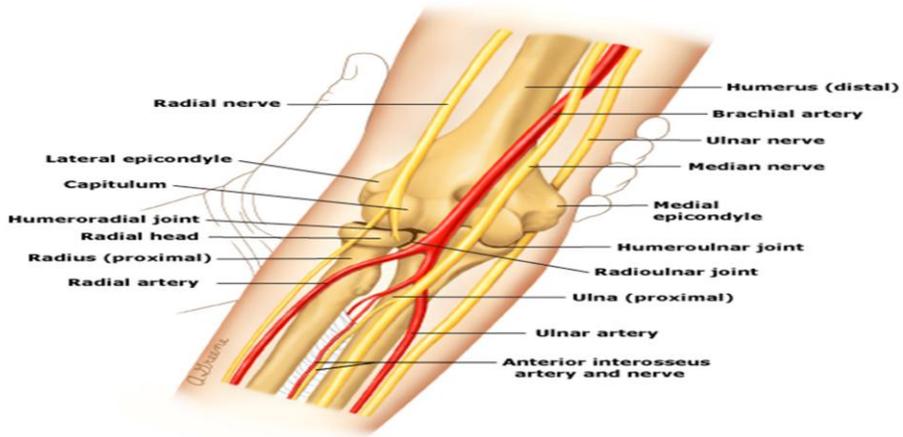
## Dislocated shoulder

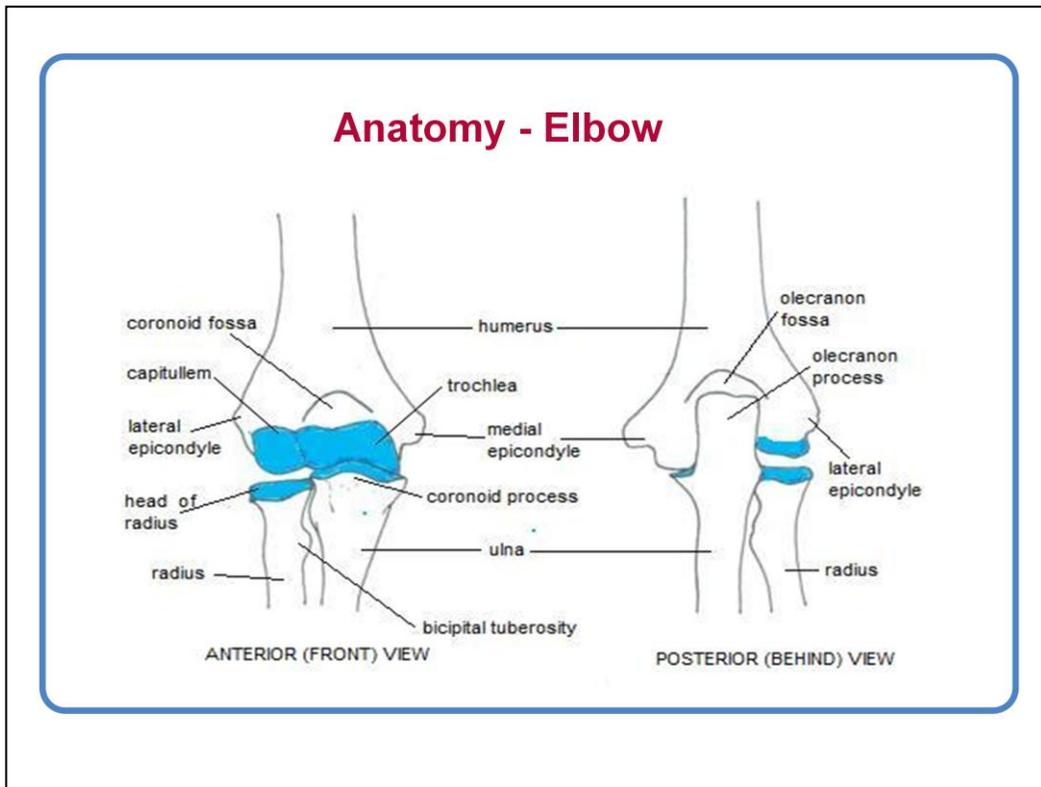


**# clavicle**



# Elbow Joint





Formed by distal end of humerus articulating with head of radius and ulna.

**How does it move?**

- Flexion
- Extension
- Supination
- Pronation

**Distal humerus:**

Medial and lateral epicondyles.  
 Ulnar nerve passes behind medial epicondyle.

**Olecranon fossa**

**Trochlea** (medial) articulates with ulna

**Capitulum** ( lateral) articulates with head of radius.

**Radius**

Cylindrical head articulates with capitulum.  
 Neck/Shaft. Rotates within annular ligament in supination and pronation

**Ulna**

Articulates with Coronoid process anteriorly.  
 Articulates with Olecranon posteriorly.  
 Shaft - subcutaneous.

**Medial Collateral Ligament**

ulnar nerve passes through middle band

**Lateral Collateral Ligament**

smaller than medial collateral ligament

## History

- Traumatic
- Throwing sports
  - Javelin
  - Tennis elbow
- Mechanism of injury
  - important in dislocations
- Systemic symptoms
  - septic arthritis

Remember children are often picked up by the arms

- Pulled elbow (annular ligament subluxes off the radial head)

## **Examination - Look**

- Swelling
- Deformity and Symmetry
- Carrying angle of arm
- Colour and Wounds

## **Examination- Feel**

***Feel** : Bony landmarks*

- *Medial & lateral epicondyles*
- *Olecranon*
- *Radial Head*
- *Radius and ulna*
- *Tissues above and below the injury*
- *Feel for an effusion*

***Neurovascular assessment***

- *Nerve sensation & function (ulnar nerve)*
- *Pulses*

*Trochlea and Capitulum not palpable*

## Examination- Move

- Flexion
  - 0-150 degrees
- Extension
  - 0-150 degrees
- Supination/Pronation
  - 90 degrees

Supinate = holding a bowl of soup

Pronate = Pissed is prone

## **Activity**

- Review the musculoskeletal assessment of the Elbow on the DVD titled “
- Practice this assessment process on a colleague

# olecranon

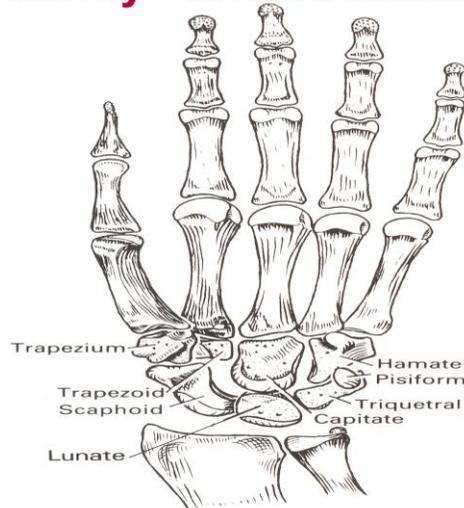


## Dislocated elbow



## **Forearm, Wrist & Hand**

## Anatomy - Wrist Joint and Hand



Bones of the Left hand and wrist

### Bones:

8 Carpal Bones

**Scaphoid lunate capitate triquetrum trapezoid  
trapezium hamate pisiform**

### Metacarpals & Phalanges

Thumb (two bones & two joints)

proximal & distal

MCP - metacarpophalangeal joint

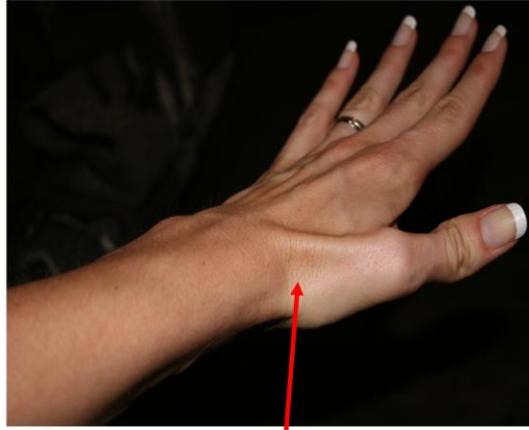
IP - interphalangeal joint

Four fingers (index, middle, ring and little) three bones & three joints

proximal, middle and proximal

Joints: MCP, PIP, DIP

## Anatomy - Wrist Joint



Anatomical  
Snuff Box

### Scaphoid

Accounts for 60% of all carpal #'s

Mechanism

**fall onto outstretched hand**

**15-30 years age group**

# Scaphoid may cause disruption to the blood supply

**resulting in avascular necrosis of the proximal fragment**

**Blood supply is distal to proximal**

**incidence is 3%**

Important to examine

**x-ray fails to pick up 15% # (waist)**

**treatment is based on clinical assessment findings**

### Lunate

**Uncommon fracture <3%**

**Mechanism: fall**

### Triquetral

**Mechanism: direct blow**

### Pisiform

### Trapezium

**Mechanism: direct blow to adducted thumb**

### Capitate

**Rare, avascular necrosis**

### Hamate

**Mechanism: Bad golf shot**

**Ring & little finger painful on flexion**

### Radial & ulnar styloids

## Examination

- **Look:** *Deformity ie dinner fork*
  - Swelling
  - Colour
  - Compare to other wrist & hand
  - Wounds
- **Feel:** Bony tenderness/sensation/pulse
  - Distal radius and ulna
  - Carpal bones especially the Scaphoid
  - Hand and digits
  - Neurovascular assessment
- **Move:** Within patients pain limit
  - Flexion & extension,
  - Pronate and supinate,
  - Fist completion, opposition, \*rotational deformity

## **Activity**

- Review the musculoskeletal assessment of the forearm, wrist and hand on the DVD titled “
- Practice this assessment process on a colleague

## Scaphoid #



**# radius and ulna**



## radius and ulna #

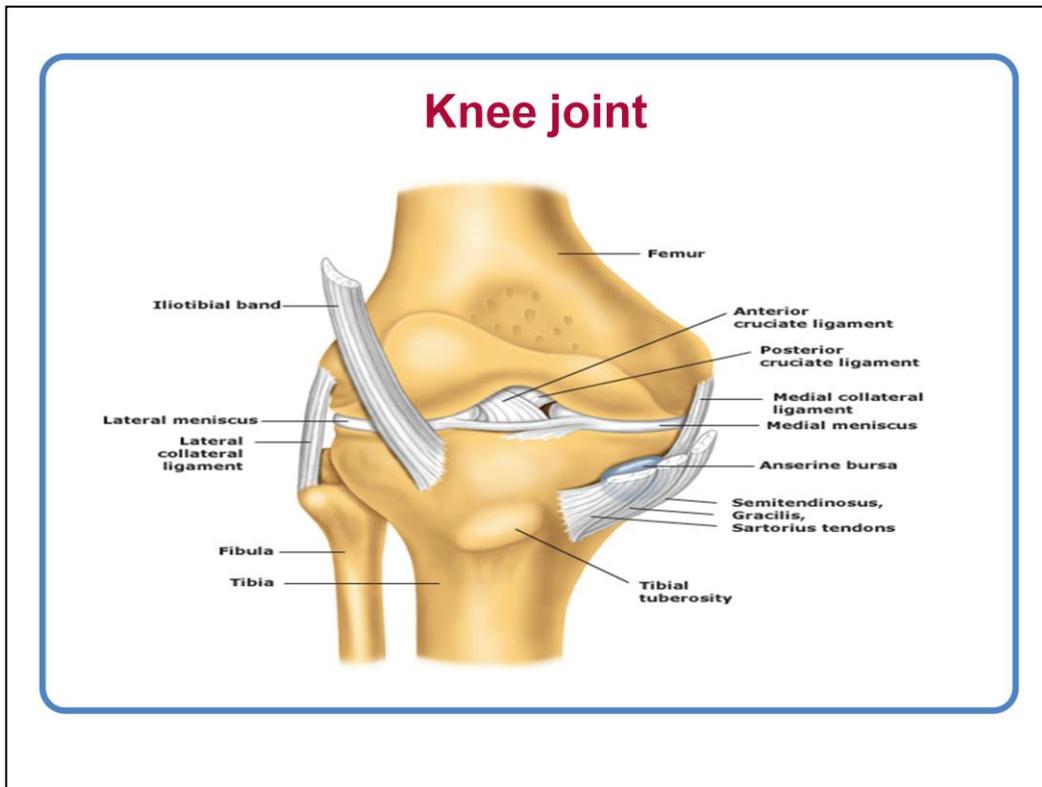


AP x-ray

**# 5<sup>th</sup> MCP**



# **Lower Limb Assessment**



## Bones

### FEMUR

2 condyles sit on tibial plateau.

### TIBIA and FIBULA

joined together at top by synovial joint and bottom by tough syndesmosis

### PATELLA

articulates with femur

moves laterally during flexion.

## Cartilage

### 2 Menisci (cartilages)

**Medial and lateral - Both C shaped**

**Medial larger**

**Fibrocartilage**

**Increases confluences of femoral condyles on tibial plateau**

**Shock absorbers**

**Injured with rotatory force**

## 4 Ligaments

Medial collateral ligament (MCL)

**Large band approx 12 cm. Attached to capsule & medial meniscus**

Lateral collateral ligament (LCL)

**ribbon like band**

Anterior cruciate ligament (ACL)

**Attached 'Anterior to posterior'**

Posterior cruciate ligament (PCL)

**Attached 'Posterior to anterior'**

## Muscles

Hamstrings

**2 medial & 1 lateral**

Gastronemius

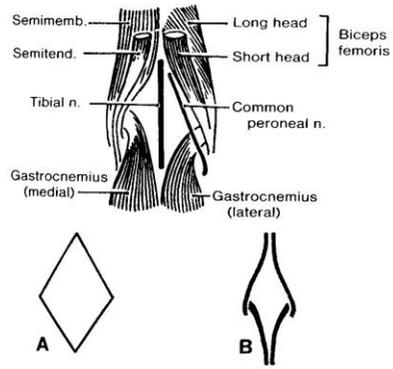
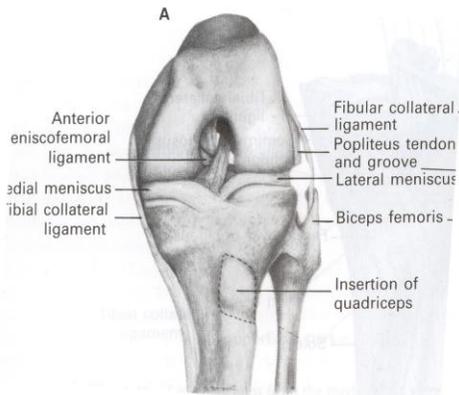
**medial and lateral head**

Create diamond at back of knee

Adductors

Quadiceps

# Anatomy - Knee Joint



## History

- Mechanism of injury (+/- trauma)
- Ability to weight bear post injury
- Pop/click/snap at time of injury
- Swelling - immediate/delayed + degree
- Locking/giving way
- Previous knee injuries/surgery/Hx OA/RA other spondyloarthropathies
- Systemic Sx - fever etc

## **Examination**

- LOOK
- MOVE
- FEEL
- SPECIAL TESTS

## **Examination**

- Remember 4 main structures to examine in knee joint:
  - **Bones**
  - **Ligaments x 4**
  - **Menisci**
  - **Muscles - patellar tendon**

## **Examination - Look**

- Compare both sides
- Swelling
- Redness
- Deformity
- Scars
- Wounds

## **Examination - Feel**

- **BONES:**

- Distal femur
- Medial & Lateral Joint lines
- Proximal Fibula
- Patella (dislocations and for tenderness)
- Tibial tuberosity

## **Examination - Feel/Special Tests**

- Ligaments/Tendons:

- Patellar tendon

- MCL/LCL/ACL/PCL

## Examination - Move

- Assess Degree of EXTENSION
  - (normal ROM = 0 - 140 degrees)
- Assess Degree of FLEXION
- Assess straight leg raise (integrity of patella tendon)\*
- NB: No Rotation at Knee joint.

If unable to get patient to straight leg raise

- Assess kick test – same test but not against gravity

## **Knee Joint Exam Checklist**

- **Look**

- Effusion /ROM

- **Bones: Feel**

- Femur/Medial & Lateral Joint lines/Proximal Fibula

- **Patella & Tibial Tuberosity**

- **Ligaments/Tendon**

- Patellar Tendon
- MCL/LCL/ACL/PCL

- **Ottawa Knee Rule**

## Ottawa Knee Rules

An x-ray is indicated if the patient has any of the following features:

Age > 55 years

Inability to bear weight both immediately and in the emergency department (4 steps) \*\*

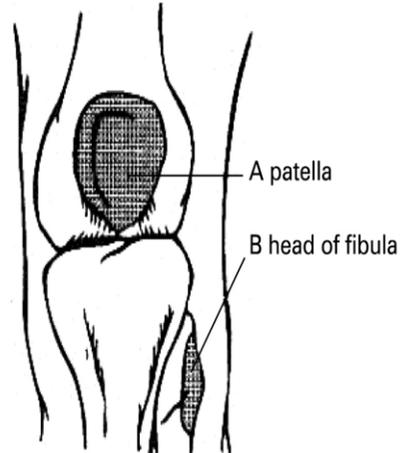
Isolated tenderness of the patella\*

Tenderness at head of fibula

Inability to flex to 90°

\*No bone tenderness of knee other than patella

\*\*Unable to bear weight twice onto each limb regardless of limping<sup>6</sup>



## Patterns of Injury

- **ACL:** landing and rotation. Pop/click/snap at time of injury. Large effusion. Giving way/instability. Climbing stairs causes problems
- **MCL** - valgus stress. No effusion. Sore turning over in bed.
- **MENISCI:** Moderate effusion - more gradual onset. Locking. Compression + rotation.

## **Activity**

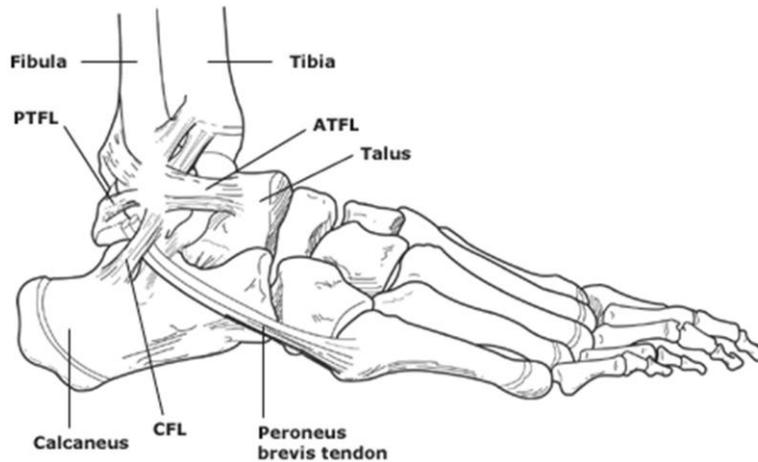
- Review the musculoskeletal assessment of the knee joint on the DVD titled “
- Practice this assessment process on a colleague

## Knee Effusion



**Ankle Joint**

## **Anatomy- Ankle Joint**



### **Bones**

**Tibia and fibula**

**joined together at bottom by strong syndesmosis  
forms ankle Mortice  
grips talus**

**Talus**

**thicker at front and thinner at back  
“wedged in” at full dorsiflexion**

### **Ligaments**

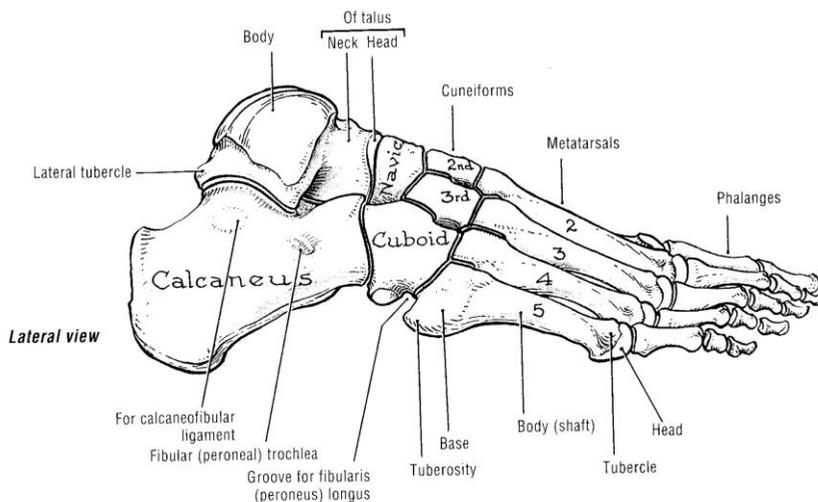
**Medial ligament**

**joins medial malleolus to talus  
deltoid ligament - 2 parts**

**Lateral ligament (4 ligaments)**

**Anterior talofibular Ligament - most commonly injured  
Calcaneofibular ligament  
Anterior inferior tibiofibular ligament  
Post talofibular ligament**

## Bones of the Foot



### 7 Tarsal bones:

#### Talus

articulates with Tibia & Fibula/Calcaneus & Navicular

#### Calcaneus

heel bone

#### Cuboid

lateral/articulates with 5th metatarsal

#### Navicular

important bone for the application of the ottawa rules

#### Cuneiform (3)

## Bones

### Metatarsals

between tarsal bones and toes

base of 5th metatarsal important because peroneal tendons attaches there.

Phalanges - proximal/middle/distal.

1<sup>st</sup> toe only has proximal and distal phalanx

### Ligaments and Tendon

Multiple ligaments in foot

usually small between bones

Peroneal tendon

attaches to base of the 5th metatarsal

can be avulsed.

## History

- Mechanism of Injury:
  - Inversion, eversion, plantarflexion, dorsiflexion
- Fall
- Ability to weight bear post injury
- Site of pain
- Previous ankle injuries/surgery
- History of RA/OA/other spondyloarthropathies
- Systemic illness

## **Examination- Look**

- Swelling/deformity/bruising/redness
- Ability to weight bear (4 steps)
- Scars from previous surgery
- Colour
- Wounds

## **Neurovascular assessment**

- **Pulses:**

- dorsalis pedis and posterior tibial

- **Nerves:**

- Checked for altered sensation to the foot

### **Deep peroneal**

1st web space

### **Superficial peroneal**

top of foot

### **Saphenous nerve**

medial side of foot to base 1st metatarsal

### **Sural nerve**

lateral side of foot.

## Examination- Move

- Dorsiflexion (0 - 20 degrees)
- Plantarflexion (0 - 60 degrees)
- Inversion
- Eversion

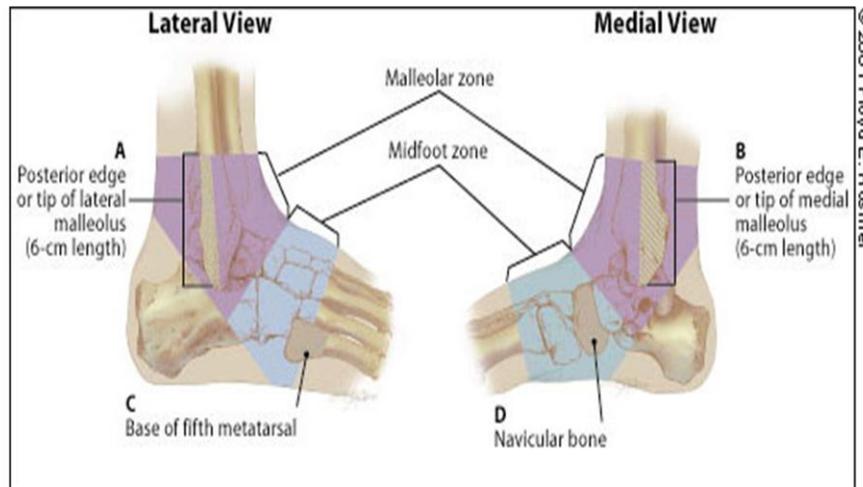
*Note ankle movements are dorsiflexion and plantarflexion **ONLY**.*

*Inversion/Eversion occur at subtalar joint.*

## **Examination- Feel**

- Bony Tenderness – refer to the Ottawa Ankle Rules
- Proximal fibula
- Ligaments: Deltoid and ATFL
- Subtalar Movement
- Anterior drawer

## Ottawa Ankle Rules



**Ankle films:** A series of ankle x-ray films 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 the emergency department.

**Foot films:** A series of foot x-ray films is required only if there is any **pain in mid-foot zone** and any of these findings:

Bone tenderness at C;

Bone tenderness at D;

**Inability to bear weight** both immediately and in the emergency department.

*Modified from Stiell, IG, McKnight, RD, Greenberg, GH, et al, JAMA 1994; 271:827.*

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## **Limitations of Ottawa Ankle Rules**

- Don't use for patients under 18!!!
- Use your clinical judgement if patient is intoxicated or un-cooperative
- Has other distracting injuries
- Has diminished lower limb sensation e.g. diabetes.

## **Ankle/Foot Exam Checklist**

- Look
  - Deformity, swelling, ROM, Wt Bearing ability
- Palpate bones
  - Proximal Fibula, Medial & Lateral malleoli, Navicular, Base 5th metatarsal (Ottawa Rule Spots)
- Palpate tarsal bones/metatarsals/other obvious sites of injury.
- Assess ligaments
  - ATFL and Deltoid ligament
- Assess neurovascular status
  - DP/PT Pulses. Foot sensation

## **Activity**

- Review the musculoskeletal assessment of the foot / ankle joint on the DVD titled “
- Practice this assessment process on a colleague

## Patterns of Injury

- Most common = inversion injury
- Likely strain ATFL
- Possible # lateral malleolus +/- base 5th metatarsal.
- Eversion injury - beware deltoid ligament injury.
- Also consider Lis Franc injuries and diastasis

Gout also presents as medial ankle or big toe pain with poor mobility, pain swelling and or erythema.

## Ankle Fracture



## Base of 5<sup>th</sup> Metatarsal Fracture



## Using Crutches



Adapted from LifeTec™ –Measuring and Using Crutches

# Sizing

## Fitting Forearm Crutches

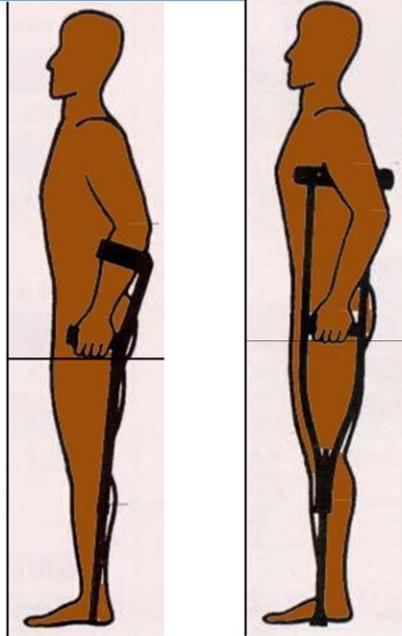
- Plant crutch end in front of foot by 6 inches
- Keep elbow slightly flexed - 15 to 30 degrees
- Place cuff at proximal forearm just distal to elbow

## Fitting Axilla Crutches

- Measure from 5cm under the user's armpit to a point on the ground about 15cm out from the side of the heel.
- This is the overall height and where the axilla pad should be set.
- Adjust the overall height by moving the centre post at the bottom up or down and securing in the right position.
- Take the measurement from the wrist crease to the same point on the ground as the first.
- This is the height for the hand grips to be set.

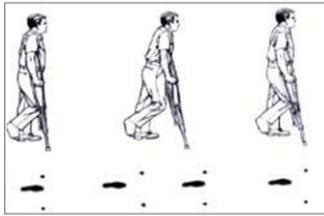
## Using Crutches

- The weight should be taken through the hands on the hand pads
- The axilla pads should be pressed against the chest wall, not high under the armpits
- The crutches should be positioned slightly to the side and forward to maintain a stable base.



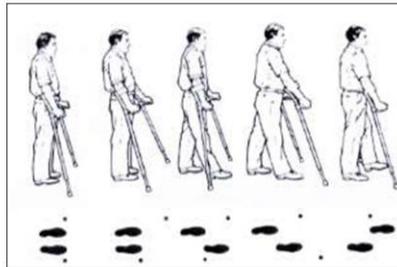
## Non weight bearing

- If the user is not to bear any weight through the affected leg, then both crutches should be put forward and the user should hop towards the space between them, to just behind the crutches
- The affected leg should be held in front of the body clear of the ground.



## Weight Bearing

- If the affected leg is to be partial weight bearing, then the user should place the crutches forward, then the affected leg, then share the load between the crutches and that leg while the unaffected leg is brought forward.



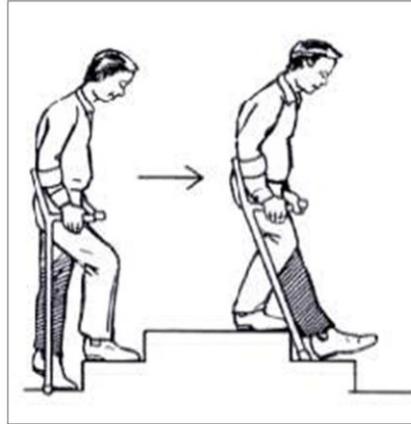
## Stairs and Steps

### Going Up:

- Lift the unaffected leg up the step first while taking the weight on the crutches and the affected leg if bearing partial weight on it.
- Then bring the crutches and the affected leg onto the same step.

### Going Down:

- Lower the affected leg and the crutches down the step first, then bring the unaffected leg down to the same step.



“Good feet go to Heaven; Bad feet go to Hell”

## **Acknowledgement:**

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Contents from her 'musculoskeletal assessment' presentation which have been included in this presentation

- DVD

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