orthopedic MINI OSCE

DONE BY : Lana
Edited by : Mohammed E. Qarmash and marah M olimat

Principles of fractures

X ray rule of two

Subject Date No.

Fractures :-

- any break in the structural continuity of the bone
- it could be closed with intact skin or open with breached skin
- it could be simple with bone splitting into 2 pieces or comminuted with multible pieces
- it could be completely separated bones or incompletely divided
- complete types are :-

(1) transverse (at rt angle to the bone long axis) (stable)(remain in place after reduction)

(2) oblique (dragonal to the bone long axis) (unstable) (shorten & redisplaced after reduction)

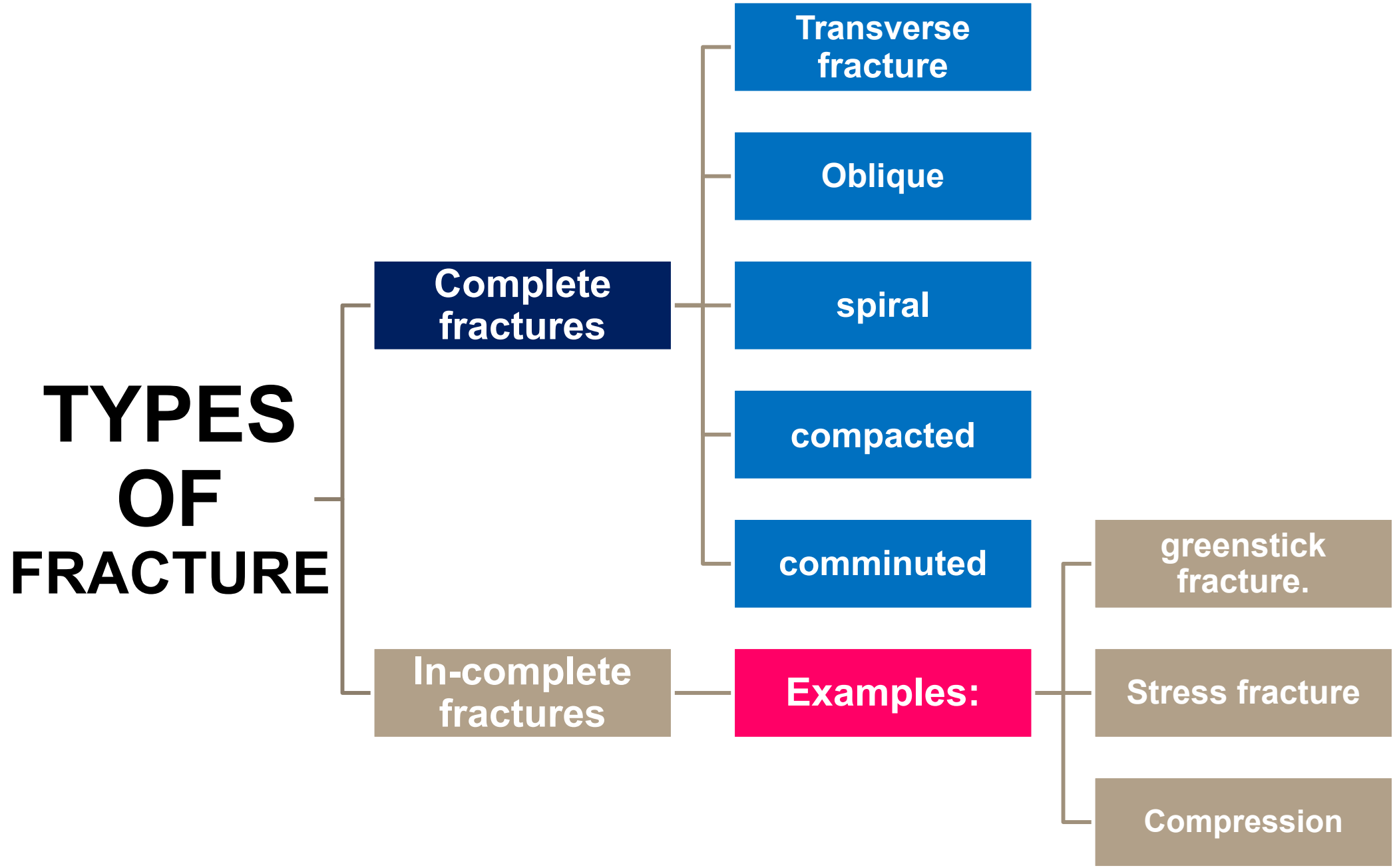
(3) spical (at least one bone twisted) (unstable) (shorten & redisplaced after reduction)

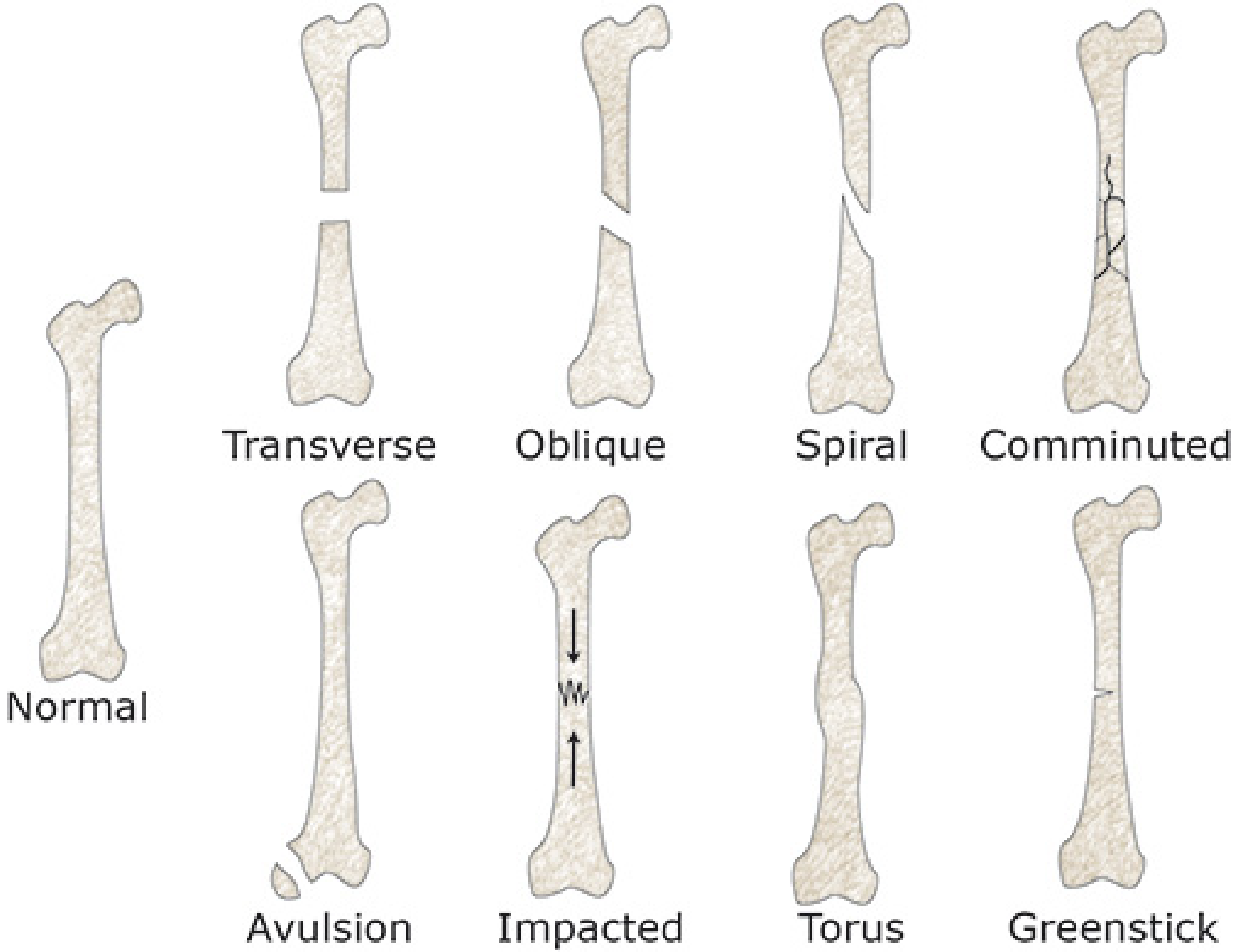
(4) compacted / impacted (Fragments are jammed together) (Fracture line is indistinct)

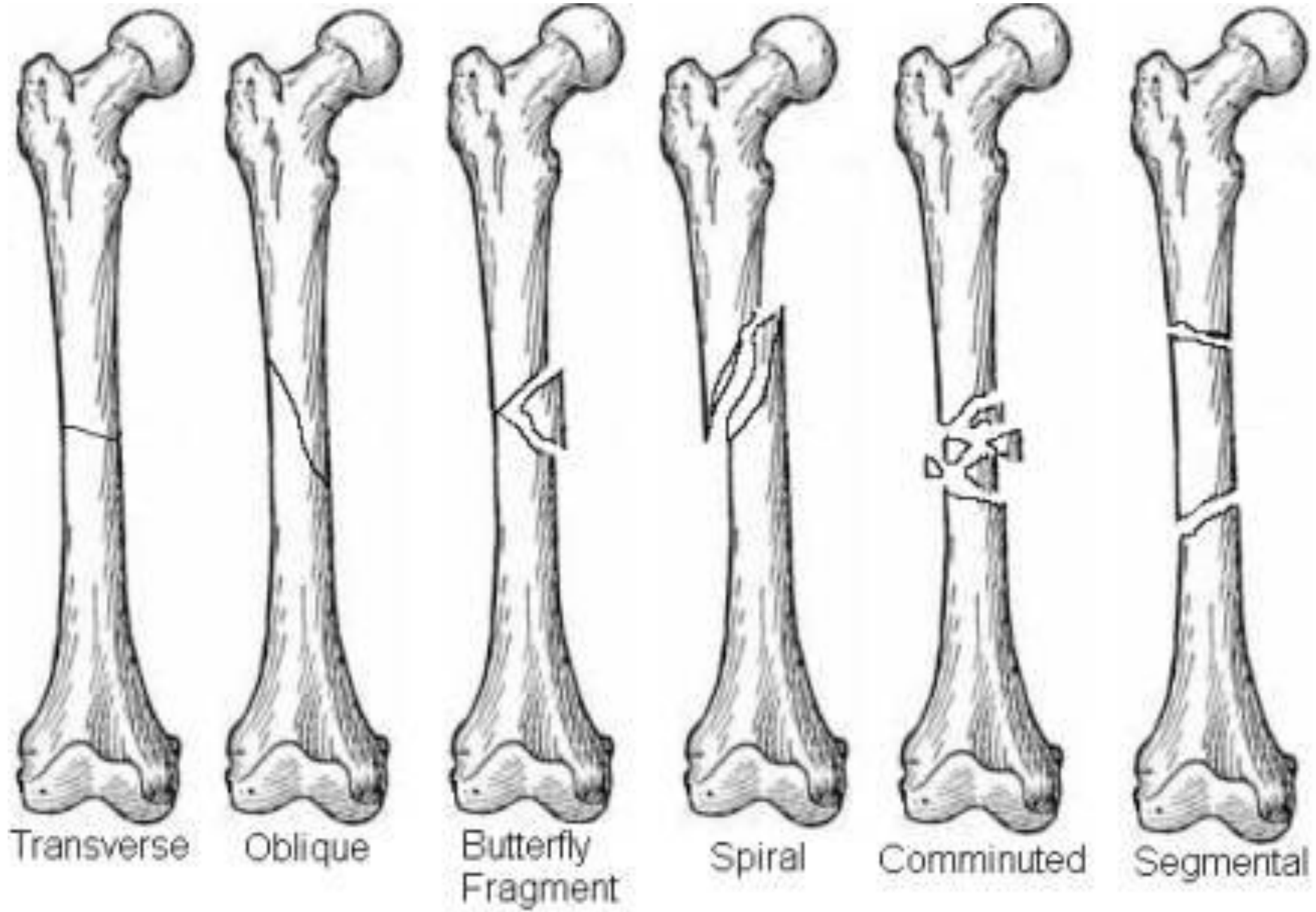
(5) segmental (3 pieces with 1 piece Floating)

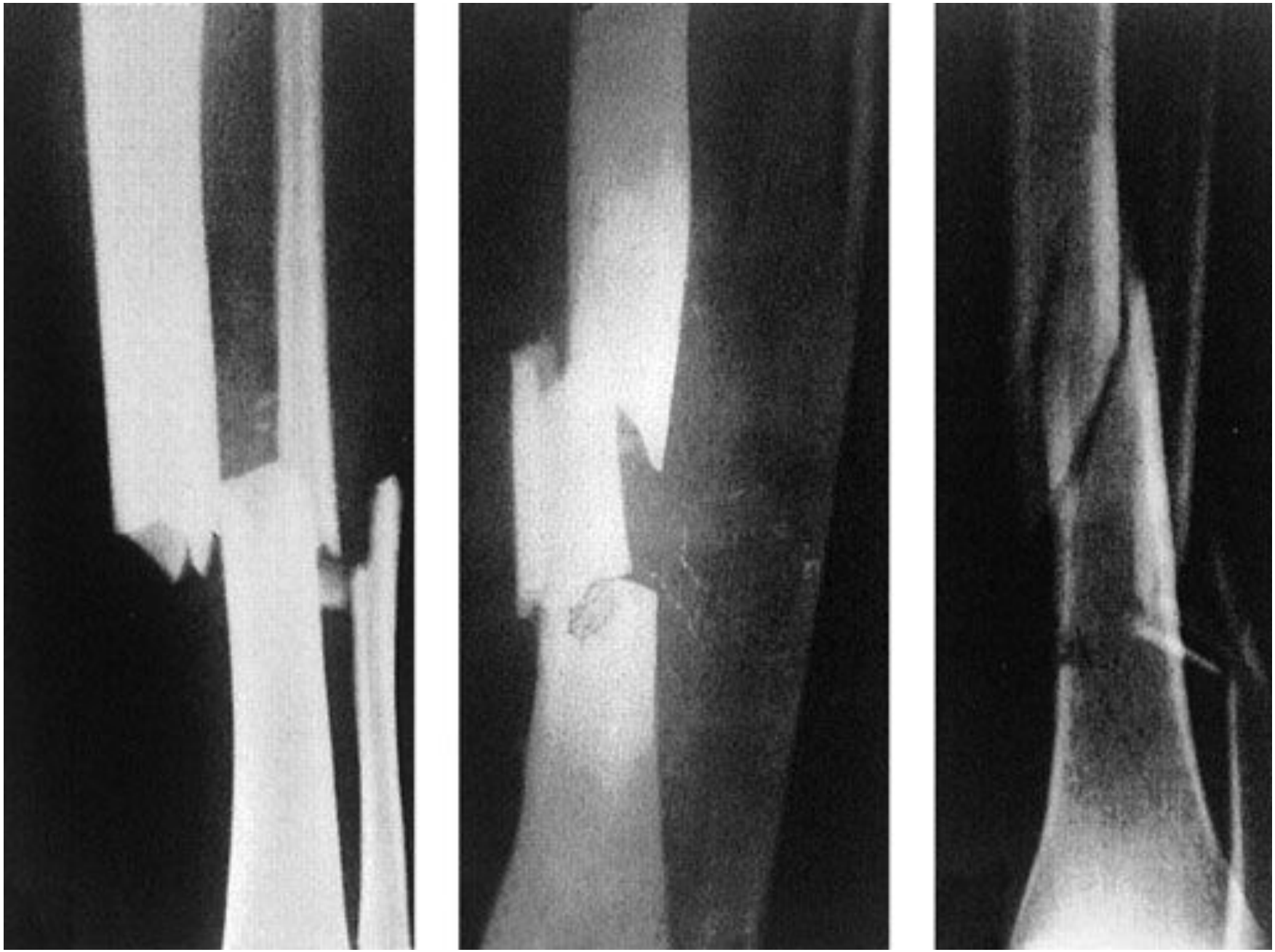
(6) comminuted (occours at 2 levels with Free segment bwt them + > 2 Fragements + unstable)

- incomplete Fractures are :-


TYPES OF FRACTURE
Complete fractures
Transverse fracture
Oblique
spiral
compacted
comminuted
In-complete fractures
Examples:
greenstick fracture.
Stress fracture
Compression

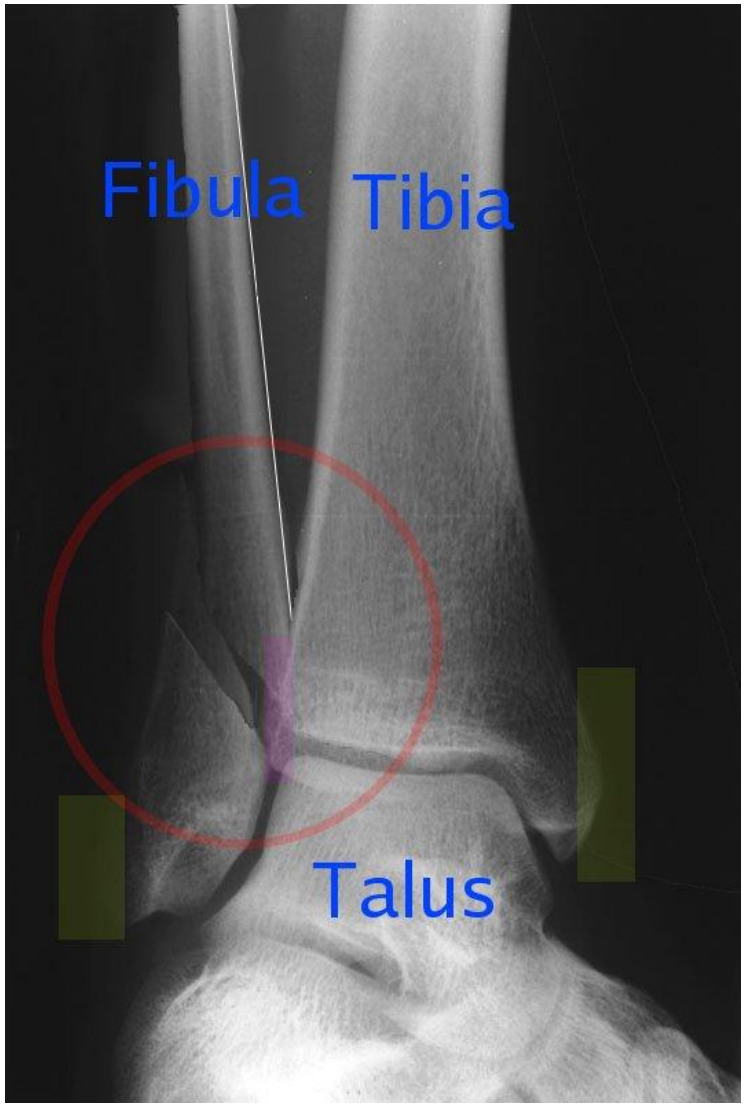

Normal
Transverse
Oblique
Spiral
Comminuted
Avulsion
Impacted
Torus
Greenstick


Transverse
Oblique
Butterfly Fragment
Spiral
Comminuted
Segmental



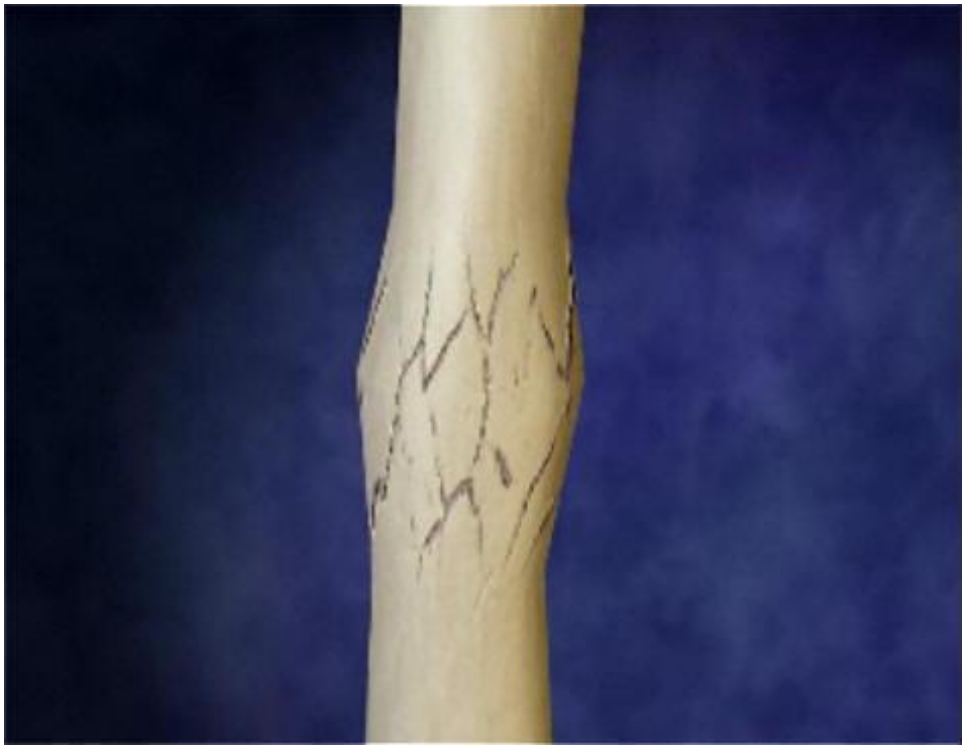
(a) Transverse (b) segmental (c) spiral

Oblique fracture



Spiral

Impacted fracture



- incomplete Fractures are:

(1) greenstick (seen in children) (the bone is bent) (also, the bone maybe deformed w/t crack in x-ray)

(2) torus/buckle (seen in children) (in the shaft of long bones especially distal radial shaft) (bulging of cortex)

(3) bow (bone become curved along its longitudinal axis)

(4) compression (cancellous (spongy) bone crumpled) (in adults) (e.x. tibial plateau, vertebral bodies in osteoprosis)

- stable means stay in a good Functional position after healing
- unstable means angulation or rotation before healing leading to poor Function in long term
- intra articular Fracture when occours in bony compenent of the joint [dislocation]
- burst Fracture in vertebra due to severe violence, acting vertically on stright spine
- could be due to forces (direct/indirect) or due to fatigue or stress
- direct Fracture, the bone breaks at the point of impact & usually:-

(1) splits the bone transiversly or bend it creating butterfly Fragment

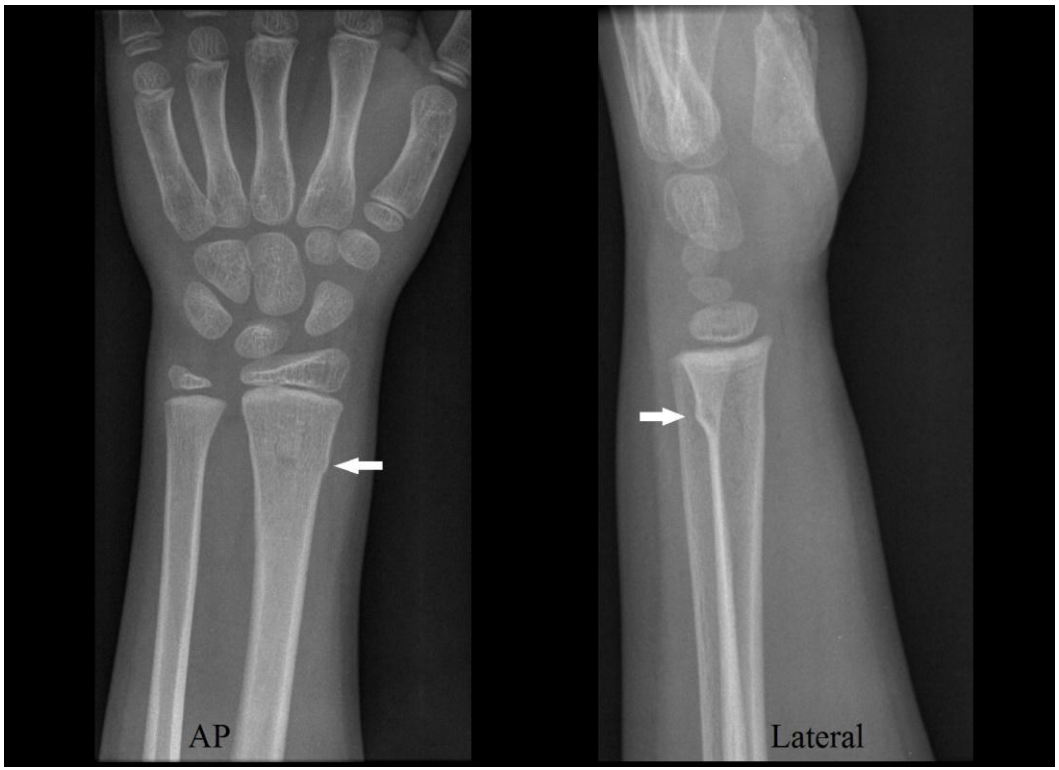
(2) if crushing occours with overlying skin damage comminuted Fractures

Greenstick fracture

Greenstick fracture of radius and ulna.

- **buckle or torus fracture**

at one side of cortex that doesn't reach the other side



BOW fracture

no fracture seen
only deformation
is seen

Compression fracture

dec in height of the vertebrae →

burst fracture

Subject Date No.

- indirect, the bone breaks at a distance From Force + soft tissue damage isn't inevitable
- Twisting ⇒ spiral Fractures compression ⇒ short oblique Fractures

Bending ⇒ transverse or triangular (butterFly) fracture) Tension ⇒ avulsion of small Fragments

- in soft tissue, it could be low energy Fracture or high energy Fracture
  - ex. closed spiral Fracture (moderate) → also, some long oblique Fractures
  - ex. comminuted (severe) & no matter whether open/close

- according to Force Fractures:- [normal bone with repeated heavy loading]
  - [1] seen in athletes, dancess, -- etc
  - [2] there's normal balance between resorption & replacment, according to WOLFF's Law, the bones adapte with the degree of mechanical loading, so any ↑↑↑ in loading, this will lead to strengthen of bones (remodling). However, any imbalance makes resorption occours Faster than replacment due to repeated prolonged exposure to stress. leading to Fracture

- insufficiency Fractures:- [normal muscular activity stress but with bone with deficincy in minerals & elastic resistance]
  - MC in 2nd metatarsal, Fibula & tibia

- pathological Fractures occours with abnormal bone, ex:-
  - locally:- INFection (OM), tumors (ewing sarcoma, osteosarcoma, enchondroma)
  - generally:- congenital (osteogenesis imperfecta) diffuse (osteoporosis, rickets, uremic osteodystrophy)

according to alphanumeric classification:-

Subject Date No.

Bone → segment → type → group → sub group

1. Humerus 2. radius & ulna 3. Femur 4. tibia & fibula

1. proximal 2. diaphyseal 3. distal 4. Malleolar

a. extra articular → a. simple

b. partial articular b. wedge

c. complete " c. complex

[other details arn't required]

CLASSIFICATION OF FRACTURES

- Alphanumeric classification developed by **Muller and colleagues** has now been adapted and revised
- In this system, the

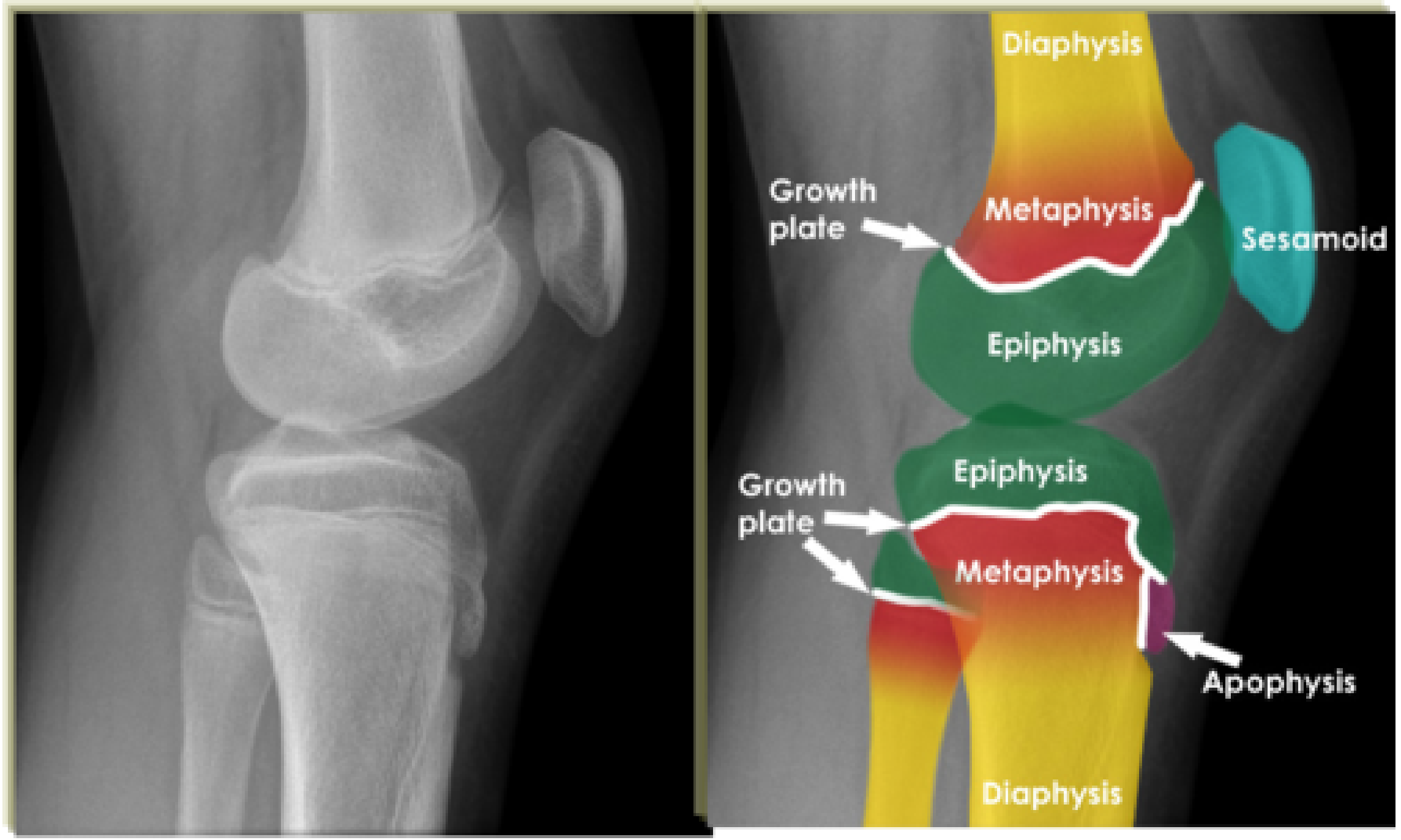
1. **first digit** specifies the bone (1=humerus, 2=Radius/ulna, 3=femur, 4=tibia/fibula).
2. **the second** the segment (1=proximal, 2=diaphyseal, 3=distal, 4=malleolar).
3. **A letter** specifies the fracture pattern

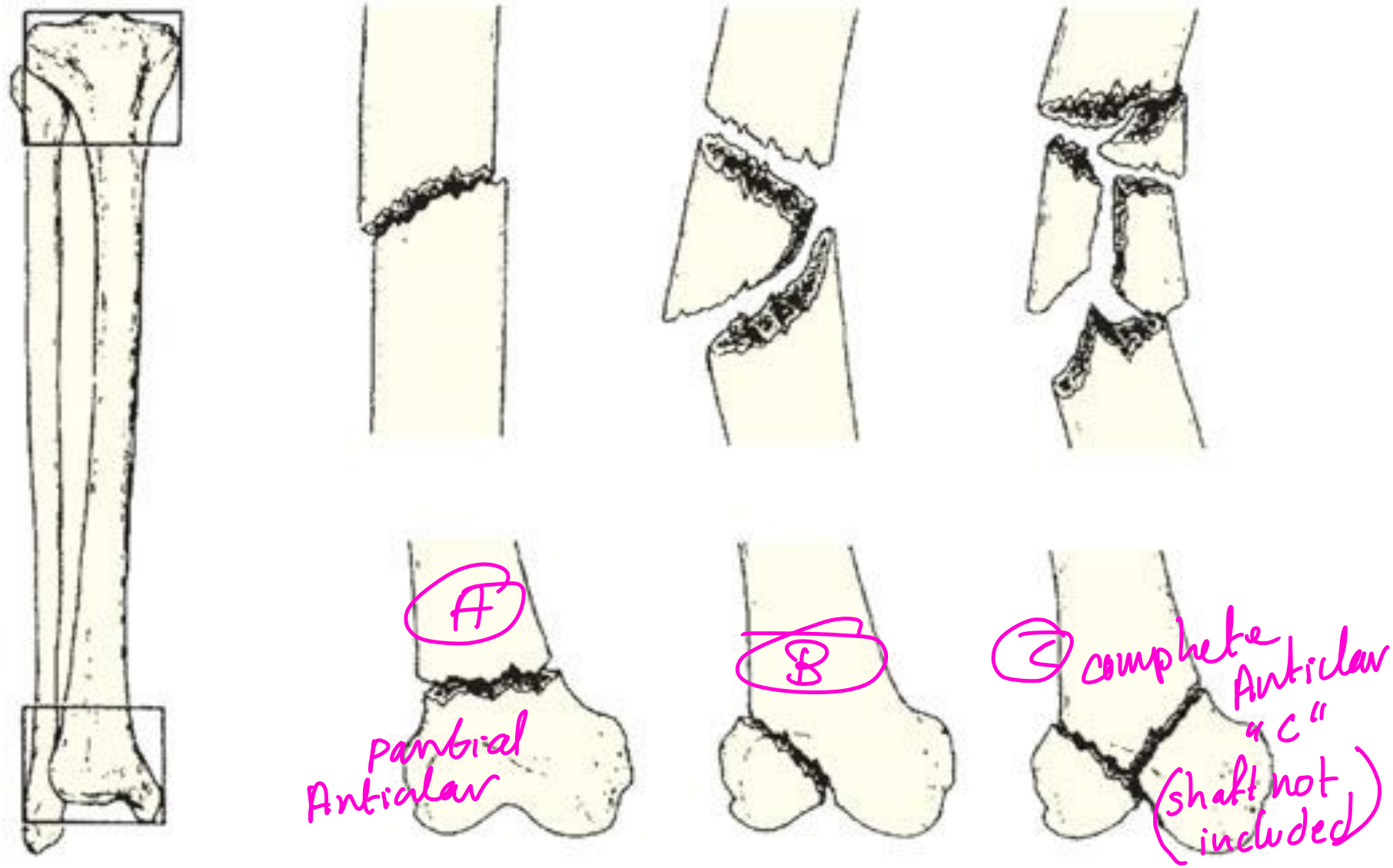
(for the diaphysis: A=simple, B=wedge, C=complex).

(for the metaphysis: A=extra-articular, B=partial articular, C=complete articular).

- **Two further numbers** specify the detailed morphology of the fracture

* Ex → fracture 11 → humerus. proximal


Diaphysis
Growth plate
Metaphysis
Sesamoid
Epiphysis
Epiphysis
Growth plate
Metaphysis
Apophysis
Diaphysis



- Each long bone has three segments – **proximal, diaphyseal and distal**; the proximal
- and distal segments are each defined by a square based on the widest part of the bone.
- **(b,c,d) Diaphyseal fractures** may be simple, wedge or complex.
- **(e,f,g) Proximal and distal fractures may be extra-articular,** partial articular of complete articular

Subject Date No.

displacment of Fractures:-

- Translation (shift) — acceptable to certain limits
- angulation (tilt) — acceptable to certain limits
- rotation (twist) — never acceptable
- length — [in pediatric] accepetable to certain limit

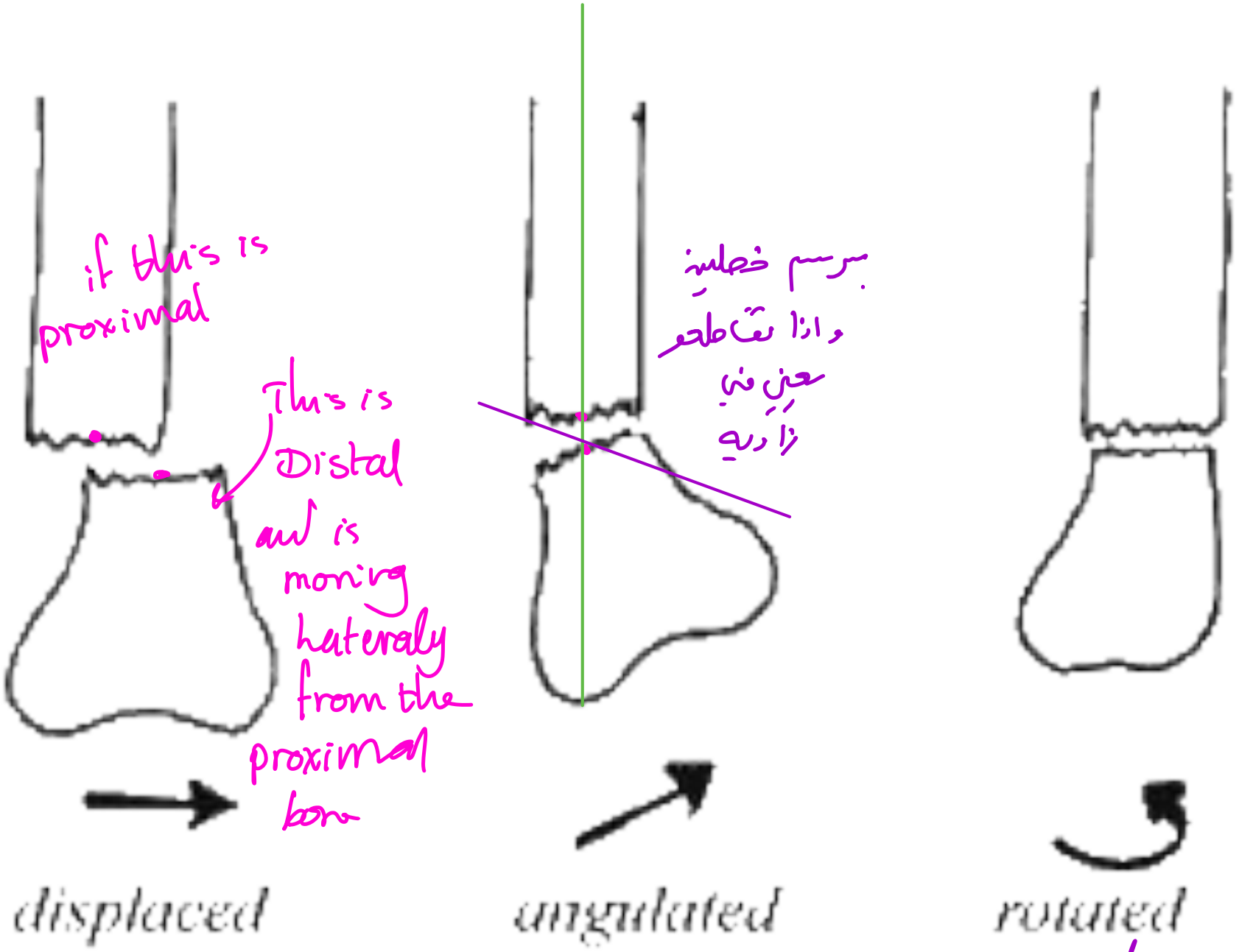
Healing by: [1] callus (naturally) [2] direct union

causes of non-union:-

[1] separation & distruction of Fragments (2) excessive movement of Fracture line

(3) severe injury that renders the local tissue is non viable

(4) infection [5] poor local Blood supply


if this is proximal
This is Distal and is moving laterally from the proximal bone
displaced
برسم خطين واذا تقاطعو معين في زاوية
angulated
rotated
- no translation
- no Angulation

non - union on X-ray :-

(1) present lucent line between bone & Fragments

(2) exubarent callus that fails to bridge the gap (hypertrophic non-union

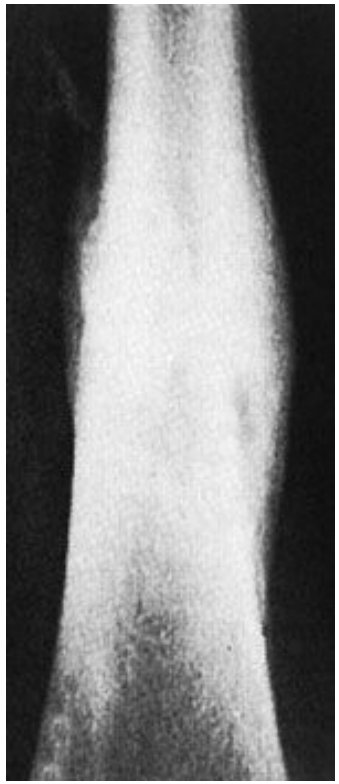
[3] in atrophic type ⇒ withered appearance to the fracture ends

. the rate of bone healing depends on :-

[1] type of bone & Fracture [2] BV [3] general constitution [4] pt. age.

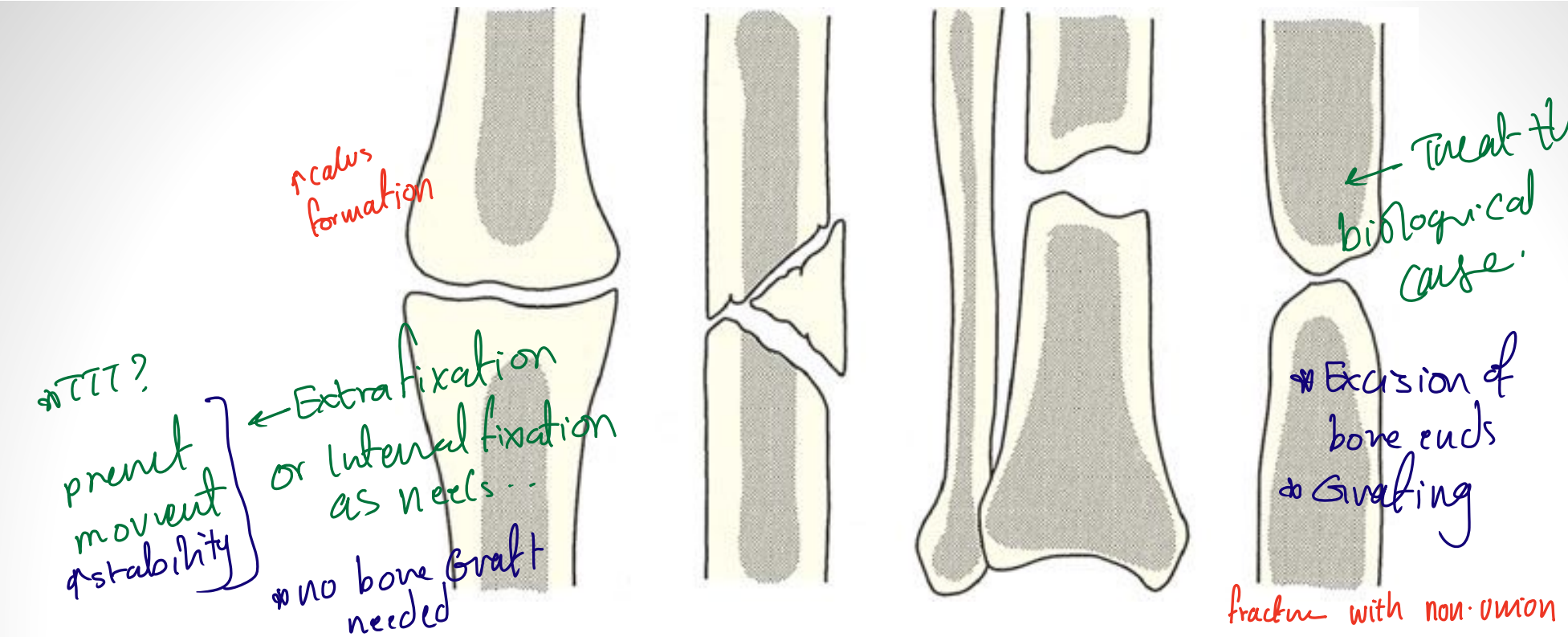
(a) Fracture

(b) union



(c) consolidation

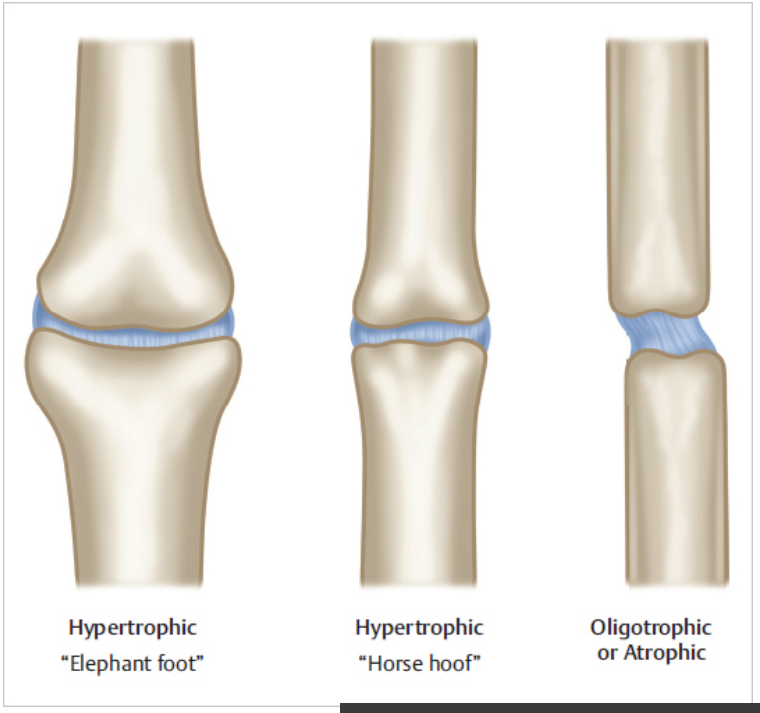
(d) Bone remodeling



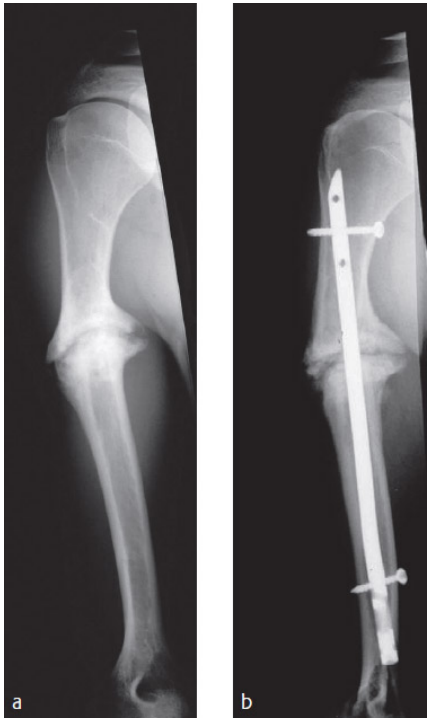
- **Aseptic non-unions are generally** divided into **hypertrophic** and **atrophic** types.
- Hypertrophic non-unions often have **florid streams of callus** around the fracture gap – the result of **insufficient stability**.
- They are sometimes given colorful names, such as:
- **(a) elephant's foot. In contrast, atrophic non-unions** usually arise from an impaired repair process; they are classified according to the x-ray appearance as **(b) necrotic**, **(c) gap and (d) atrophic**

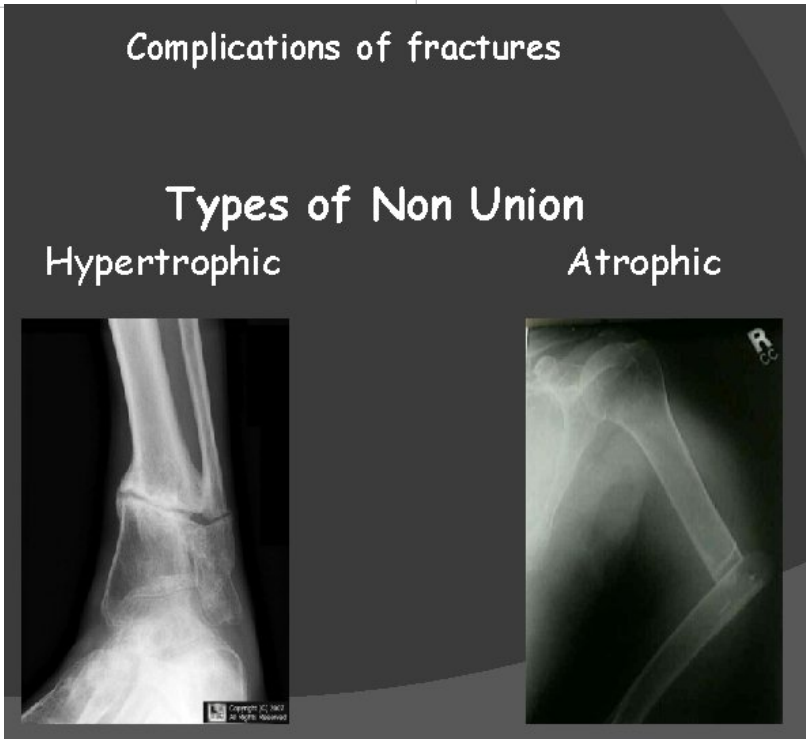
Mechanical cause prevents healing

Biological cause

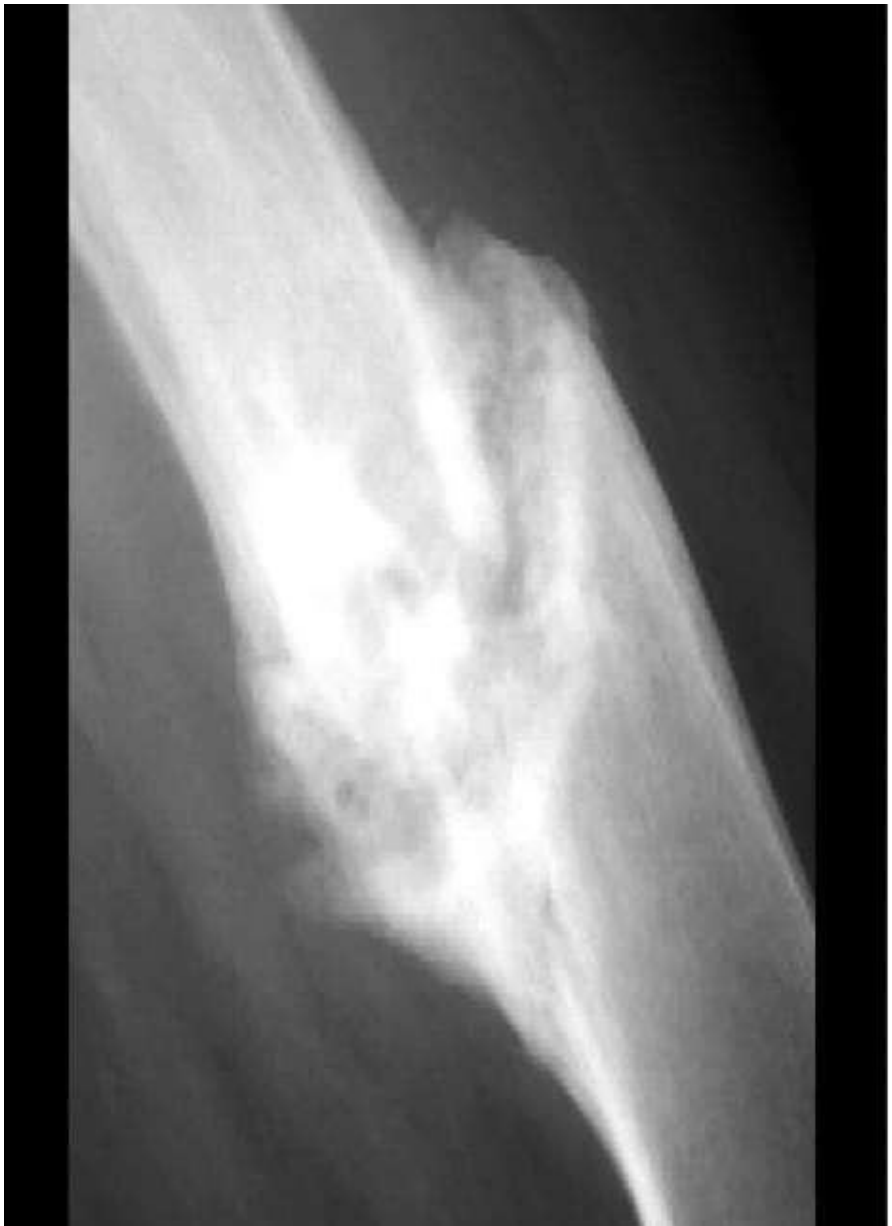


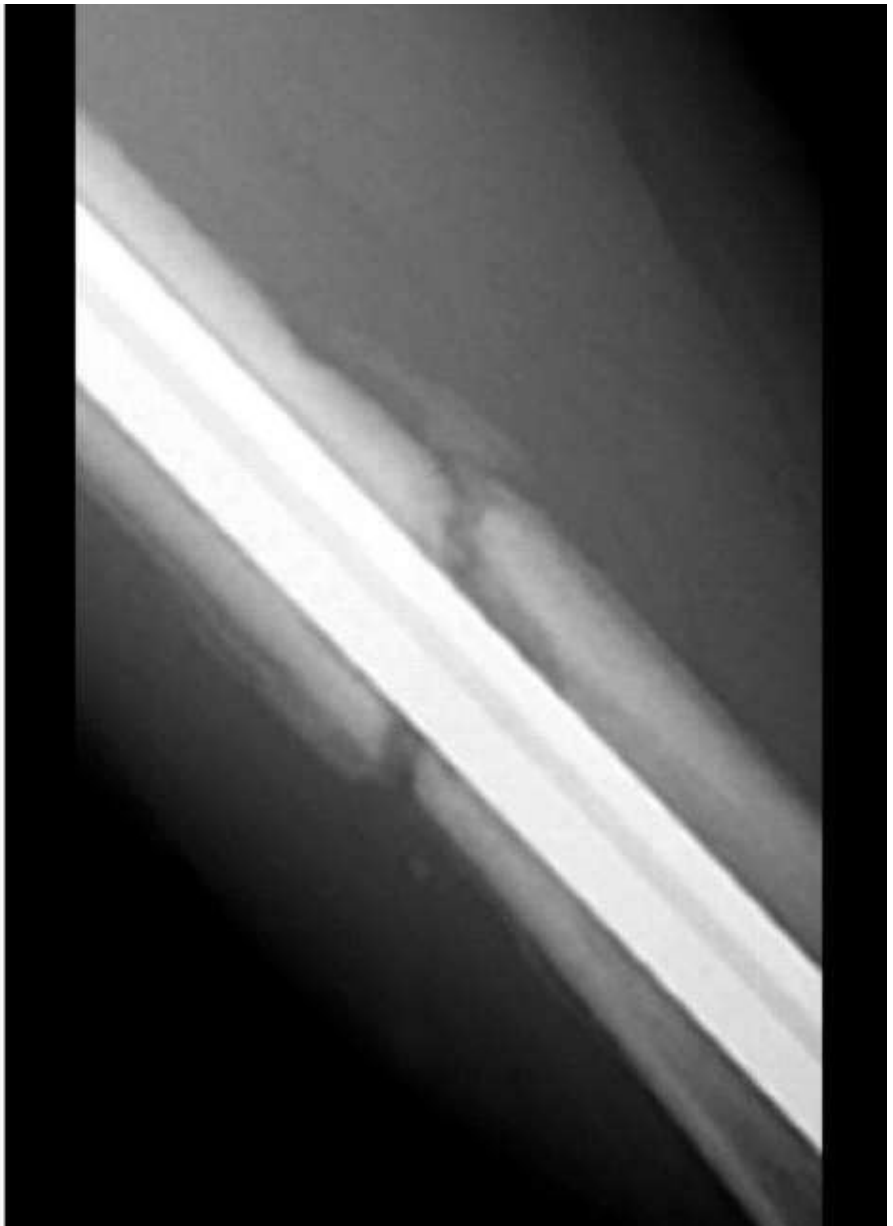
Hypertrophic Nonunion





Non Union - Treated by a Nail





45 years old, sustained humerus fracture 9 months ago, this is the x-ray now

A- what is the diagnosis of this complication?

Non-atrophic Non-union

B- what is the cause of this condition?

They have given rise to the acronym **CASS**:

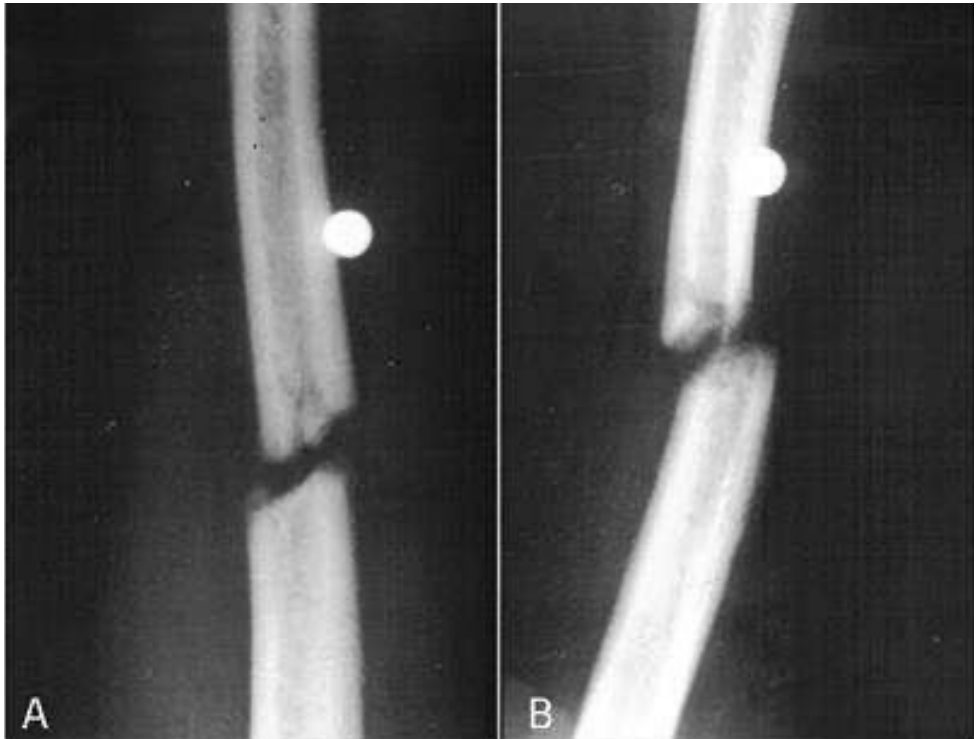
Contact – Was there sufficient contact between the fragments?

Alignment – Was the fracture adequately aligned, to reduce shear?

Stability – Was the fracture held with sufficient stability?

Stimulation – Was it sufficiently 'stimulated'? (e.g. by encouraging weight bearing).

There are, of course, also biological and patient related reasons that may lead to non-union: Poor soft tissues (from either the injury or surgery), Local infection associated drug abuse, anti-inflammatory or, immunosuppressant meds, Non-compliance



Average time for healing	Upper limb	Lower limb
Callus visible	2-3 weeks	2-3 weeks
union	4-6 weeks	8-12 weeks
consolidation	6-8 weeks	12-16 weeks

- in open Fractures, theres a coutact with the atmospher or external environment
- mostly due to high energy event (gunshot / RTA) but it could be dae to low energy (sport, Falling)

Gustilo Classification for open fractures

	I	II	III-A	III-B	III-C
Energy of mechanism	Low	Moderate	High	High	High
Wound size	<1 cm	>1 cm	Usually >10 cm	Usually >10 cm	Usually >10 cm
Soft tissue injury	Low	Moderate	Extensive	Extensive	Extensive
Contamination	NO	Low	Severe	Variable	Variable
Conminution/ Fracture pattern	No/ Simple	Some/ Simple	Severe/ Complex	Severe/ Complex	Severe/ Complex
Soft tissue coverage	Yes	Yes	Yes	No, requires reconstructive procedure	Variable
Vacular injury injury	No	No	No	No	Yes, require reparation

Grade 1

Grade 2

Grade 2

Grade 3 A

Grade 3 b

Grade 3 C

Why use this classification?

- Grades of soft tissue injury correlates with infection and fracture healing

Grade	1	2	3A	3B	3C
Infection Rates	0-2%	2-7%	10-25%	10-50%	25-50%
Fracture Healing (weeks)	21-28	28-28	30-35	30-35	
Amputation Rate					50%

Open Fracture

Gustilo's classification

<1cm

Type 1 is a low-energy fracture with a small, clean wound and little soft-tissue damage.

Type II is a moderate-energy fracture with a clean wound more than 1 cm long, but no skin flap, not much soft-tissue damage and no more than moderate comminution of the fracture.

Type III is a high-energy fracture with extensive damage to skin, soft tissue and neurovascular structures, and contamination of the wound. >10 cm

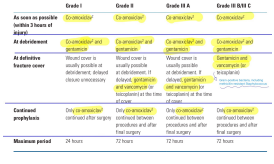
- Type III A the fractured bone can be adequately covered by muscle or skin, despite the laceration
- Type III B there is extensive periosteal stripping and fracture cover is not possible without the use of local or distant flaps
- Type III C if there is an arterial injury which needs to be repaired, regardless of the amount of other soft-tissue damage.

※ initial managment

1. Covered with cleane & material until reach accident department
2. Rapid general assessment address any life threatening condition
3. Tetanus prophylaxis is adminsted
4. Antibiotics - the sooner the better (within 3hr ↓ infection 15%)
   - Amoxicillin or cefuroxime
   - clindamycin in case of Penicillin alergey.
5. Photographed the wound.

※ Treatment

1. Antibiotic prophylaxis
2. debridement
3. stabilize the fracture
4. early definitive wound cover.



- Restoring length, alignment Rotation
- reduction

- Removal of dead tissue and foreign material.

※ irrigation
- Normal saline (NS)
- usually about 3L is used For grade 1, and 6–10 L for grade 2 and 3※.

Repeated examination of the limb is important; remember that open fractures also can be associated with a compartment syndrome.

according to the management:

[1] covering the wound with sterile dressing until reaching accident department

[2] in hospital, general assessment + Tetanus + Ab (if the dx is confirmed)

[3] essentials to prevent the wound from becoming infected:

- treat as emergency
- debridement & re-debridement
- stablize Fracture & early closure then Ab → should be broad spectrum, usually gentamicin
  - → removal of dead tissue and foreign material to ensure good blood supply
    - irrigation :- usually Normal saline
      use high volume low pressure
      3L For grade 1
      6-10 L For grade II or III
  - → once the vascular repair completed, do stabilization to restore the normal alignment for good healing

according to closure : For wounds without skin loss : tension free 1ry closure

c/I :- (1) delayed presentation >12 hrs or administration of Ab >1/2 hrs

(2) Immunocompromised, or deep seated contamination

For wounds with skin loss :- healing by 2ry intention + delayed 1ry closure

SSG & Free Flaps

Note :- type I, II, III can be closed primeraly if there's no contaminat

type I II IIIa stabilized by external Fixation

type IIIbgc stabilized by internal Fixation

Post op :- ① elevate the limb ② monitore the circulation ③ Ab

④ plastic surgury for grafting if there's alot of skin los

Table 25.1 Local complications of fractures

Urgent	Less urgent	Late
Vascular injury	Pressure sores and blisters	Malunion
Local visceral injury	Nerve entrapment	Non-union
Compartment syndrome	Heterotopic ossification	Avascular necrosis
Haemarthrosis	Ligament injury	Muscle contracture
Nerve injury	Tendon lesions	Joint instability
Infection	Joint stiffness	Regional pain syndrome
Gas gangrene	Regional pain syndrome	Osteoarthritis

. Local complications → Early
→ Late

The difference between "emergency" and "urgency" is that an emergency is an immediate threat to the well being and urgency is threat to the well being, in near future. Emergency is considered a situation where the life, health, property or environment faces an immediate threat

↳ Early complications :

1. Visceral injury → Rib # → pneumothorax
→ pelvic # → Rupture of bladder or urethra

2. Nerve injury → Tell-tale signs should be looked for & documented

Common nerve injuries

Injury	Nerve
Shoulder dislocation	Axillary
Humeral shaft fracture	Radial
Humeral supracondylar fracture	Radial or median (anterior interosseous)
Elbow medial condyle	Ulnar
Elbow dislocation	Ulnar
Monteggia fracture–dislocation	Posterior interosseous
Hip dislocation	Sciatic
Knee dislocation	Peroneal

2. Nerve injury

Injury	Nerves at risk	Clinical signs
Shoulder Dislocation	Axillary	Loss of deltoid contraction Numbness over regimental badge
Humerus (arm) Fracture	Radial	Wrist drop Numbness over the back of hand
Supracondylar Elbow Fracture	Median (Anterior Interosseous nerve)	Loss of thumb and index flexion Inability to make the OK sign
Elbow Medial Condyle	Ulnar Nerve	Claw Hand
Forearm Fracture	Radial (Posterior Interosseous nerve)	Fingers and thumb drop (at knuckles) Deviated wrist extension
Monteggia fracture and dislocation	Radial (Posterior Interosseous nerve)	Fingers and thumb drop (at knuckles) Deviated wrist extension
Hip Dislocation	Sciatic	Foot drop Numbness over the back of foot
Knee Dislocation	Common peroneal nerve	Foot drop ~~Numbness over the back of foot~~ (Dorsum of the foot except the first webspace between hallux and 2nd digit) - Loss of sensation

3. Vascular injury → torn vessels can be sutured or replaced by a vein-graft
→ thrombosed → endarterectomy

Common vascular injuries

Injury	Vessel
First rib fracture	Subclavian
Shoulder dislocation	Axillary
Humeral supracondylar fracture	Brachial
Elbow dislocation	Brachial
Pelvic fracture	~~Presacral and internal~~ Popliteal iliac
Femoral supracondylar fracture	Femoral
Knee dislocation	Popliteal
Proximal tibial fracture	Popliteal or its branches

3. Vascular injury

Injury	Artery Affected
1st Rib Fracture	Subclavian Artery
Shoulder Dislocation	Axillary Artery
Humeral Supracondylar Fracture	Brachial Artery
Elbow Dislocation	Brachial Artery
Pelvic Fracture	Presacral and the internal iliac
Femoral Shaft	Femoral Artery
Femoral Supracondylar Fracture	Popliteal artery! (based on dr. Kefah, Saeed)
Knee Dislocation	Popliteal Artery
Proximal Tibial Fracture	Popliteal or Its Branches

4. Compartment syndrome → Necrosis of muscle : Volkmann's contracture



. Symptoms : Pain, Paresthesia, Pulselessness, Pallor, Paralysis
↳ Bursting sensation

. Ischemic muscle is highly sensitive to stretch → When toes/fingers passively hyperextended → ↑ pain in calf / forearm

. Fasciotomy

. Δp (diff. betw. Dia. & Comp) < 30 mm Hg → Immediate compartment decompression

• Compartment syndrome:

→ it's increase a pressure in osteofascial compartment.

→ Fracture, burns, high energy trauma → inflamatory process → increase pressure in the compartment

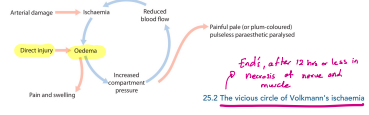
→ muscles are coverd by fascia (dense Fibrous tissue → so when you have a trauma there is inflamation inside, more Fluids gain in, the pressw will go up until it compromised Blood flow and compartment Syndrome will happen.

→ if you don't treat it, will end by (volkman's ischaemic contracture) → dead muscle, Non-mobile limb

→ most important compartment Syndrome → in the leg → thigh → Forearm → hand.

→ _ normal compartment P (0-10) mmHg
- up to 20 mmHg blood Flow is decreased
- > 30-40 mmHg → damage to muscle and nerve, ischemic necrosis will happen

→ First structur affected by compartment is Nerve

→ 

25.2 The vicious circle of Volkmann's ischaemia

End!, after 12 hrs or less in P Necrosis of nerve and muscle.

→ diagnosis

- Compartment syndrome is most commonly associated with long-bone fractures of the tibia, but may result from isolated soft-tissue injuries and involve any extremity compartment.
  - 2 arm compartments: Anterior, posterior
  - 2 forearm compartments: Dorsal, volar
  - 3 thigh compartments: Anterior, medial, posterior
  - 3 gluteal compartments: Gluteus maximus, gluteus medius and minimus, and tensor fascia latae.
  - 4 hand compartments: Thenar, hypothenar, central, interossei
  - 4 leg compartments: Anterior, lateral, superficial posterior, and deep posterior.
  - 4 foot compartments: Medial, lateral, central, interosseous

1 Clinical features

• Look at fracture is it high risk injury ? ← elbow
- forearm
- proximal 1/3 of tibia
- multiple ✱ of hand and Foot
- Crush injury or circumferential burns.

• 5 (P's)
- pain.
- Paraesthesia.
- pallor.
- paralysis.
- pulselessness.

dont wait all of these 5 we have to expect compartment

- earliest of the classic features
- Passive stretching will induce more pain; as ischaemic muscle highly sensitive to stretch.

• how you can confirm compartment in unconscious compartment ? No pain
→ intra Compartmental pressure
↳ calculate the Δ pressure (ΔP)
↳ difference between diastolic and intra compartmental pressure
<30 → this is compartment

- **NOTE:** If facilities for measuring compartmental pressures are not available, the decision to operate will have to be made on clinical grounds.
- If three or more signs are present, the diagnosis is almost certain
- If the clinical signs are 'soft', the limb should be examined at 30-minute intervals and if there is no improvement within 2 hours of splitting the dressings, fasciotomy should be performed.
- Muscle will be dead after 4–6 hours of total ischaemia **there is no time to loose!**

• Treatment

"decompression"
① remove casts, bandages - —
② lie the limb Flat don't elevate → P will go down
③ Fasciotomy.


high energy trauma increase incidence of limb compartment syndrome


hemorrhagic blisters.

Fasciotomy

5 Haemarthrosis

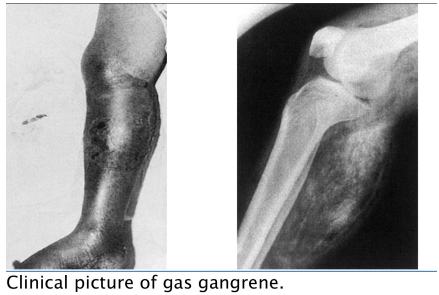
- Blood inside the joint mostly because ✱
- swelling, tense, decrease level of motion.
- aspirat and put ice

6. Infection → post traumatic wound infection is the most common cause of chronic osteomyelitis

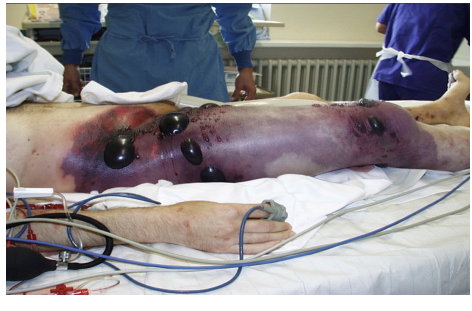
- much higher in open fracture
- keep dressing, clean
- give IV antibiotic within first 3hrs so you decrease the rate of infection

7. Gas gangrene
- → Caused by Clostridium Welchii
- → Intense pain, swelling, brown discharge, bad smell
- → Myonecrosis
- → Differentiate from anerobic cellulitis
- → Tt: Hyperbaric O_2, decompression, remove dead tissue, amputation

- Symptoms appear within 24 hrs
  1. intense pain and swelling
  2. brownish discharge
  3. characteristic smell
- Treatment
  1. early - diagnosis
  2. debridement
  3. Fluid, IV anti-biotics
  4. hyperbaric oxygen
  5. amputation



Clinical picture of gas gangrene.
X-rays show diffuse gas in the muscles of the calf



8. # Blisters → prevented by film bandaging

9 plaster sores & pressure sores
↳ prevented by padding the bony points

2 type < clear Fluid-Filled vesicles → in high energy trauma
Blood stained → if trauma more severe

Late complications.

1. Delayed union
   - → Drugs: NSAIDs
   - → Age
   - → Nutrition
   - → Type of #
   - → Smoking

2. Nonunion
   - → Hypertrophic type: Calus formation but without bridging, needs internal fixation
   - → Atrophic type: No calus, nutritional / ↓ blood supply / immunosupression / infection

3. Malunion

• Delayed union

※ causes
- Biological
  - ↓ Blood supply
  - severe soft tissue damage
  - preiosteal stripping
- Biomechanical
  - imperfect splintage → the Fracture is moving
  - over-rigid Fixation → and this piece is Far not < 2mm
  - infection
- patient related → immunosupression (cortico steroid)

※ presentation
① Fracture tenderness
② on x-ray
- lines remain visible
- callus formation

※ treatment
① eliminate any possible cause
② promote healing → {appropriate invironment}
- immobilize and Keep muscle movement.
  - Give a brace
  - OR internal Fixation
- internal Fixation and bone grafting.
  - ↳ From illiac creast or anywhere in body.

• Non-union

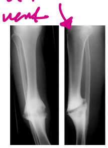
※ nothing happening to the bone.

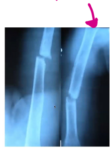
※ 2 types
- hypertrophic
- atrophic

→ in hypertrophic → there is a good blood supply. The bone is trying to heal, But because the movent it can't

→ atrophic → No new bone Formation. Bone has fixed well But Blood supply is not okey

→ so in hypertrophic, atrophic
- hypertrophic: good biological environment But alot of movent
- atrophic: No good biological environment, No movent





• malunion

- The bone healed, But in the wrong position (angulation)

- patient will have pseudarthrosis → New joint, moving not painful

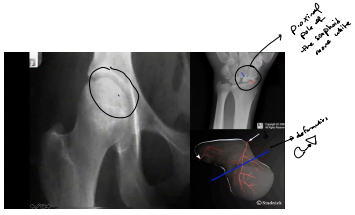
- operative
  - Rigid fixation
  - Bone graft
  - If there is shorting → add Ilizarov external Fixation

※ acceptable reduction
→ depend on age and sex ↘ وكل منطقة إلها قيمة معينة
- مثلاً بال Forearm ← بتقبل لحد angulation 10 degree فلو كانت منه او هيك بيمشي حاله
أما لو كانت more
↳ we can't accept it, we have to reduce it.

※ in general in long bone we accept 10-15 degree.

Avascular necrosis (AVN)

- occurs in → head of the femur → neck Fracture → loss of Blood supply to the head
  - Scaphoid
  - lunate and talus

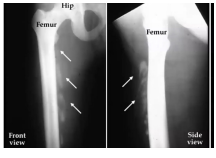


- presentation → acutly will not complain, then will start having pain, on x-ray will have sclerosis (more white)
- treatment → when < Function is abnormal / patient has a pain

→ in old people: replace (Bipolar or total hip) "arthroplasty" (plastic hip)
in young: realignment osteotomy or arthrodesis.

myositis ossificans

- Heterotopic Ossification of muscle around the joints
  - swelling, soft tissue tenderness
  - indomethacin or radiotherapy to prevent a recurrence



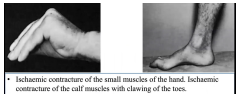
Tendon lesion "Tendinitis"

inflamation of tendon can happen with any Fracture.

Nerve Compression

muscular contracture

- like Volkmann's ischemic contracture with compartment syndrome.
- example



Ischaemic contracture of the small muscles of the hand. Ischaemic contracture of the calf muscles with clawing of the toes.

Joint instability

- If there is → ligamentous laxity.
  - muscle weakness.
  - Bone loss.
- most common site < Shoulder. / pattela.

Joint Stiffness

- The worst complication you could have
- treatment → physiotherapy
  - arthroscopic-guided release Fibrous tissue inside.
  - might open it up.

complex regional-pain syndrom "Algodystrophy"

- may type either From trauma or trauma to the nerve
- swelling, redness, unable to move
- on X-ray → periarticular osteopenia
- tt → anti-inflamatory drugs, physiotherapy and exercise

osteoarthritis

- If fracture involving articular surface and not reduced anatomically

2 late complication

- The general complications of fractures.
  - FES
  - DVT/PE → give anticoagulant as prophylaxis, like LMWH - warfarin
  - Atelectasis → collapse of the alveoli
  - Tetanus
  - Crush syndrome

• Fast embolism syndrome (FES)

- circulatory Fat globules larger than 10 μm
- closed Fractur of long bone
- source → bone marrowe
- Symptoms → similar to ARDS tachypnea tachycardia + petechiae
- supportive therapy → high flow oxygen ....

• Tetanus →

- When you have open Fracture, you have to give tetanus toxoid
- tonic, and later clonic contractions
- diaphragm could be involved resulting in asphyxia

• Crush syndrome

- Traumatic rhabdomyolysis
- The crushed limb is underperfused and myonecrosis follows, leading to the release of toxic metabolites when the limb is freed and so generating a *reperfusion injury*.
- myoglobinurea and oxygen radicals go to the Bloodstream, myoglobin goes to the Kidney that may Cause Kidny Failure
- ttt – Fluids, antibiotics, alKalization of the urine.

2. Nerve injury

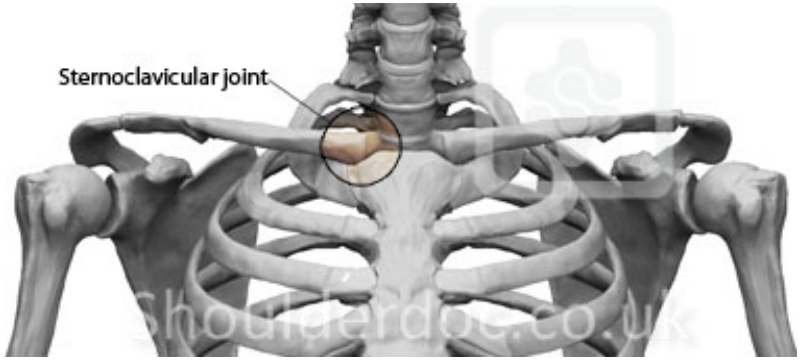
Injury	Nerves at risk	Clinical signs
Shoulder Dislocation	Axillary	Loss of deltoid contraction Numbness over regimental badge
Humerus (arm) Fracture	Radial	Wrist drop Numbness over the back of hand
Supracondylar Elbow Fracture	Median (Anterior Interosseous nerve)	Loss of thumb and index flexion Inability to make the OK sign
Elbow Medial Condyle	Ulnar Nerve	Claw Hand
Forearm Fracture	Radial (Posterior Interosseous nerve)	Fingers and thumb drop (at knuckles) Deviated wrist extension
Monteggia fracture and dislocation	Radial (Posterior Interosseous nerve)	Fingers and thumb drop (at knuckles) Deviated wrist extension
Hip Dislocation	Sciatic	Foot drop Numbness over the back of foot
Knee Dislocation	Common peroneal nerve	Foot drop ~~Numbness over the back of foot~~

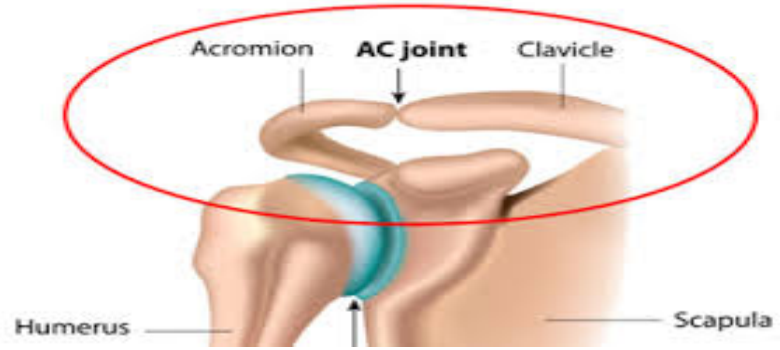
(Dorsum of the foot except the first webspace between hallux and 2nd digit)
- Loss of sensation

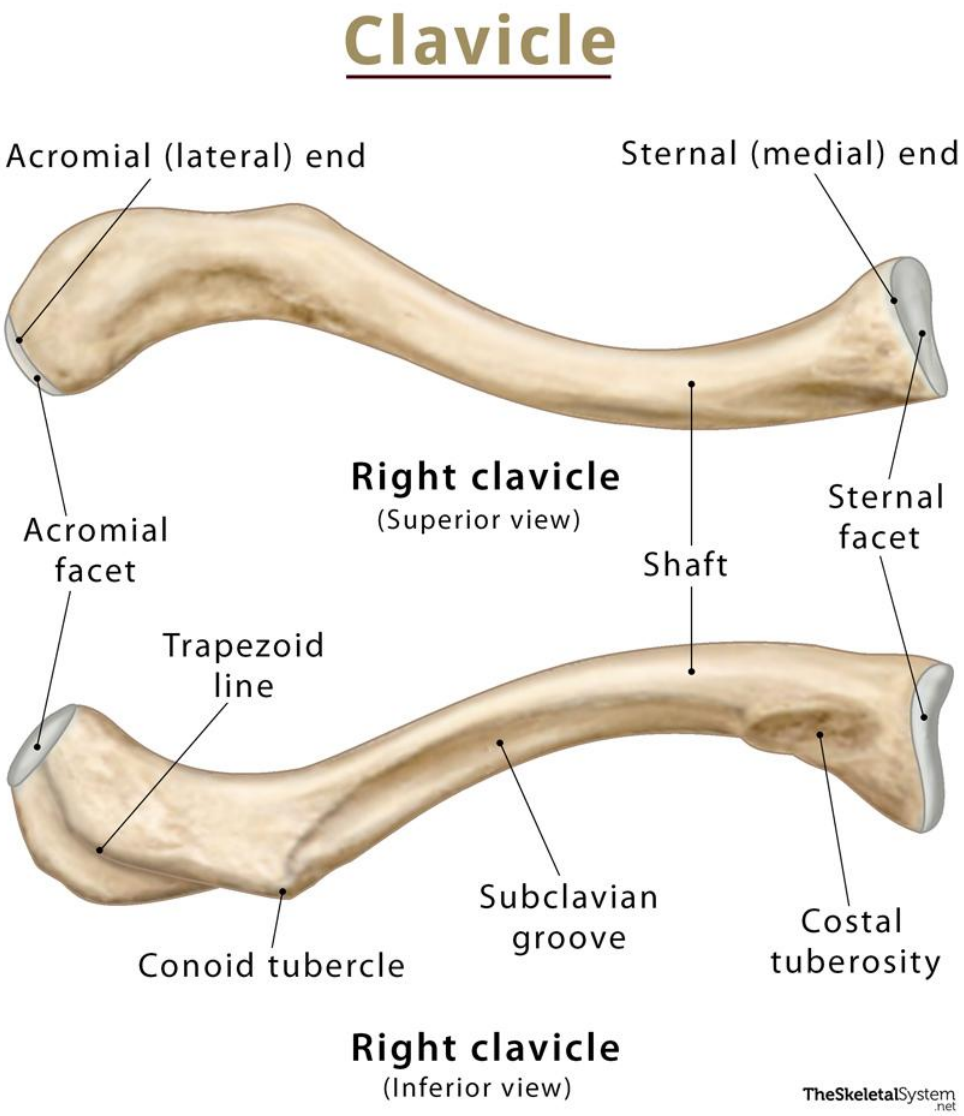
3. Vascular injury

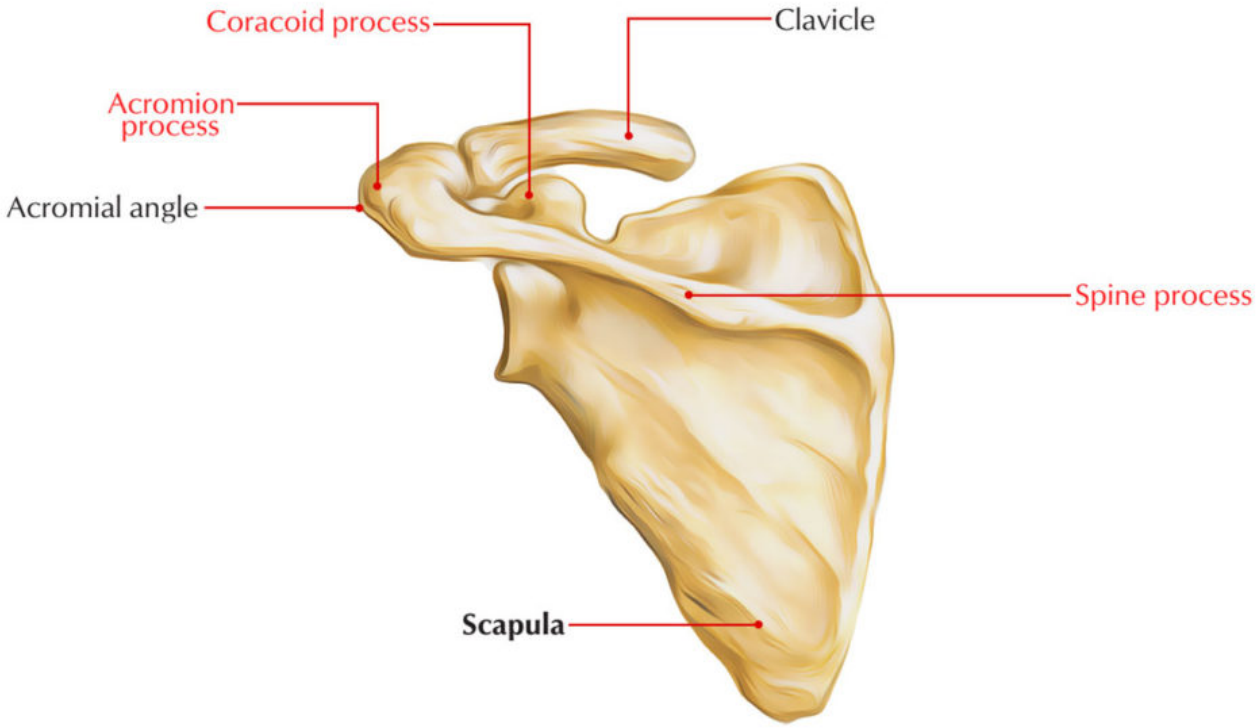
Injury	Artery Affected
1st Rib Fracture	Subclavian Artery
Shoulder Dislocation	Axillary Artery
Humeral Supracondylar Fracture	Brachial Artery
Elbow Dislocation	Brachial Artery
Pelvic Fracture	Presacral and the internal iliac
Femoral Shaft	Femoral Artery
Femoral Supracondylar Fracture	Popliteal artery! (based on dr. Kefah, Saeed)
Knee Dislocation	Popliteal Artery
Proximal Tibial Fracture	Popliteal or Its Branches

Upper Limbs Fractures

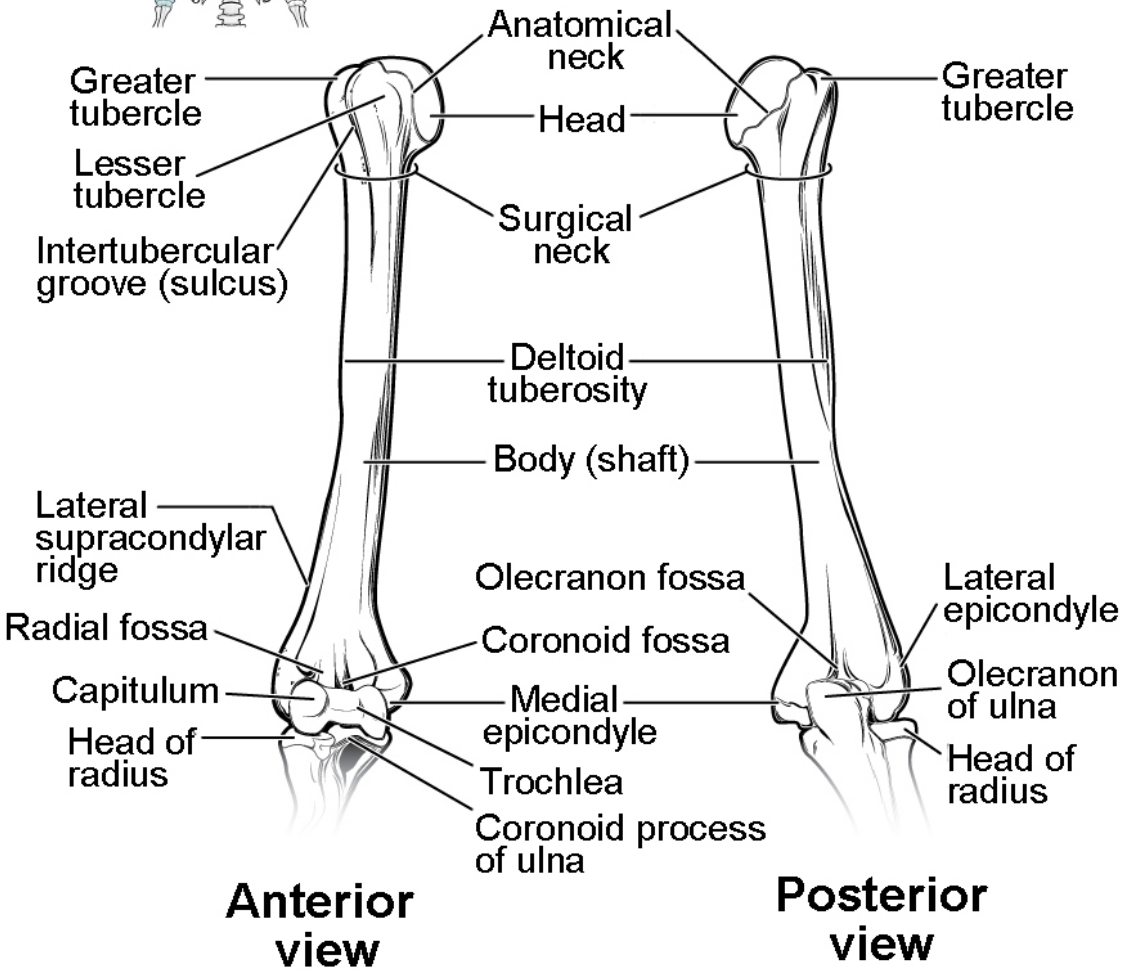


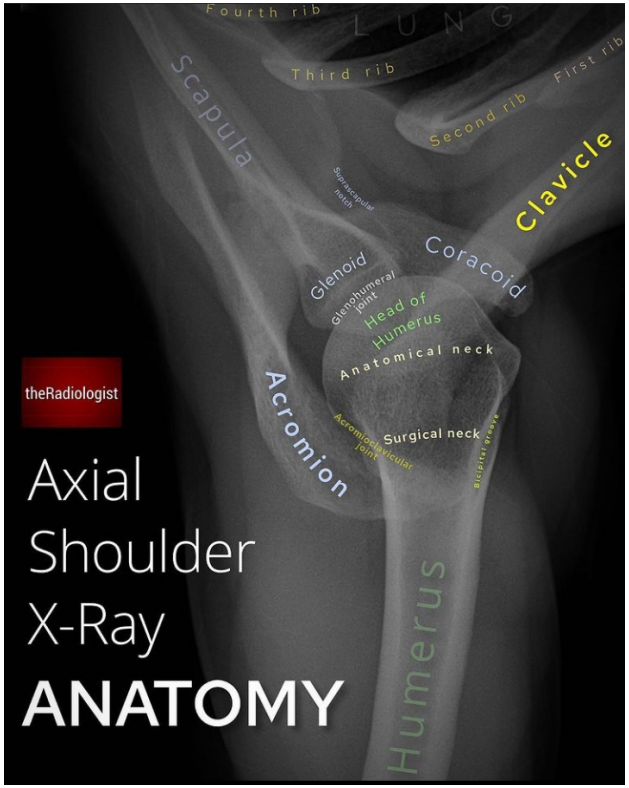




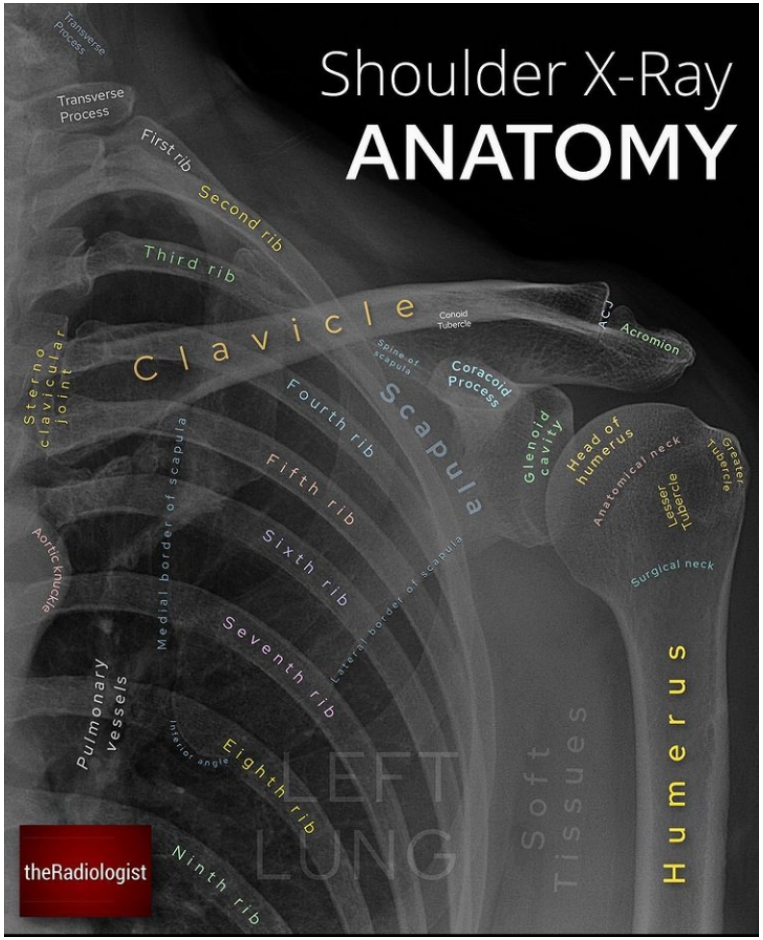

Coracoid process
Clavicle
Acromion process
Acromial angle
Spine process
Scapula

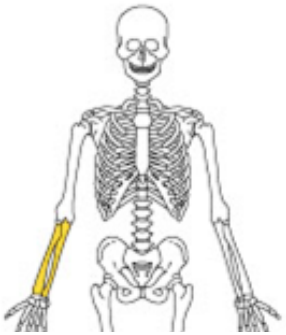
Humerus

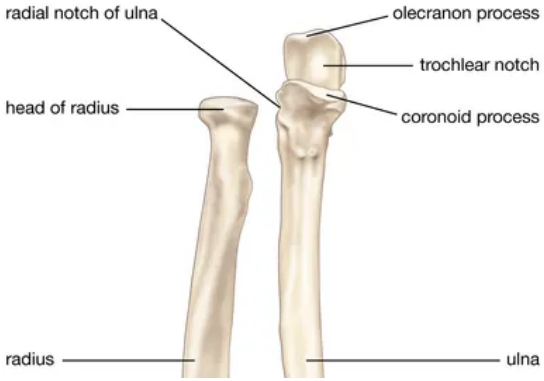

Anatomical neck
Greater tubercle
Head
Greater tubercle
Lesser tubercle
Surgical neck
Intertubercular groove (sulcus)
Deltoid tuberosity
Body (shaft)
Lateral supracondylar ridge
Olecranon fossa
Lateral epicondyle
Radial fossa
Coronoid fossa
Olecranon of ulna
Capitulum
Medial epicondyle
Head of radius
Trochlea
Head of radius
Coronoid process of ulna
Anterior view
Posterior view



Lateral View of the shoulder



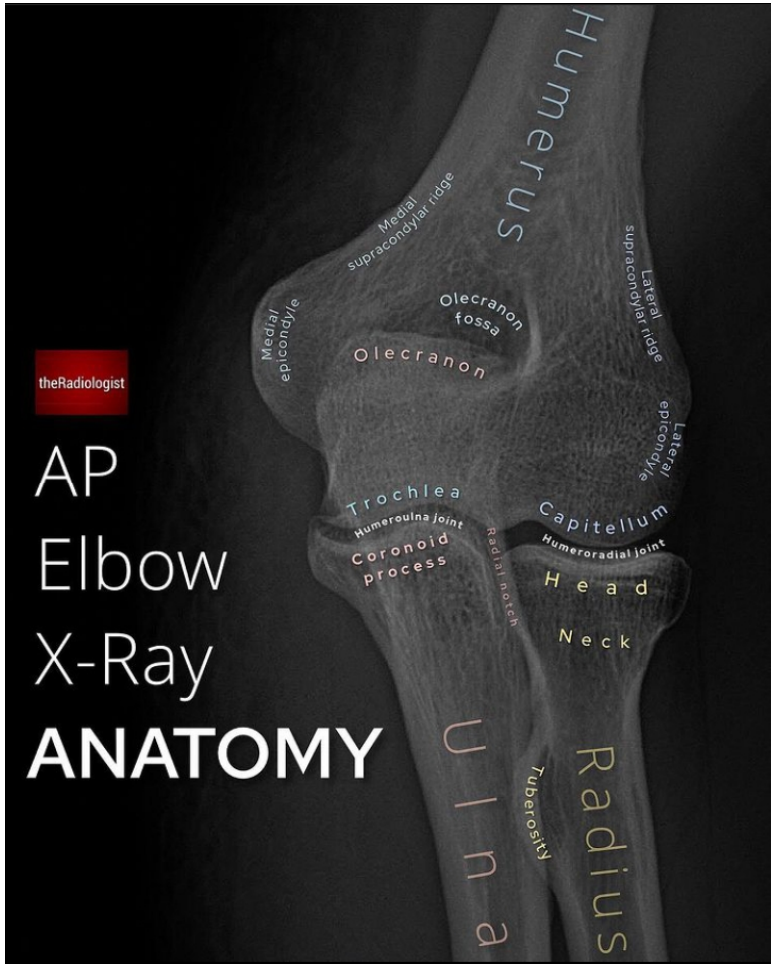


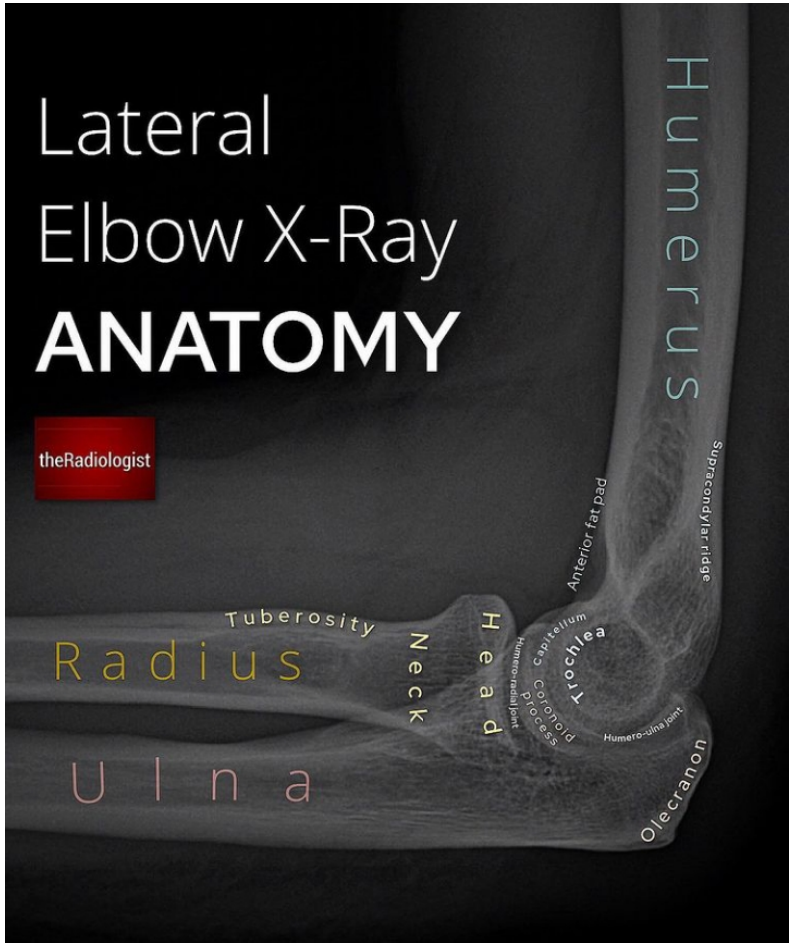


Radial notch
Olecranon process
Head
Trochlear notch
Neck
Coronoid process
Radial tuberosity
Proximal radioulnar joint
Head of radius
Neck of radius
Interosseous membrane
Ulna
Radius
Radius
Ulnar notch
Head of ulna
Styloid process of ulna
Styloid process of radius
Distal radioulnar joint
Styloid process of radius

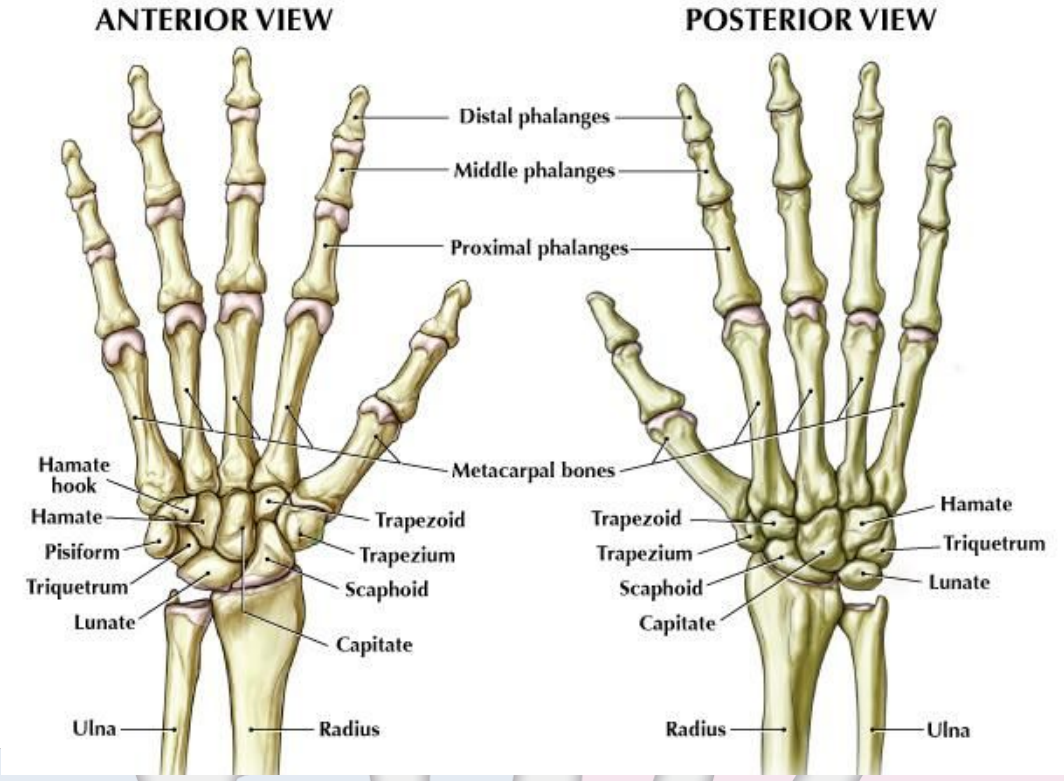
(a) Anterior view

(b) Posterior view


theRadiologist
AP
Elbow
X-Ray
ANATOMY
Humerus
Medial epicondyle
Medial supracondylar ridge
Olecranon fossa
Olecranon
Lateral supracondylar ridge
Lateral epicondyle
Trochlea
Humeroulna joint
Coronoid process
Radial notch
Capitellum
Humeroradial joint
Head
Neck
Ulna
Tuberosity
Radius

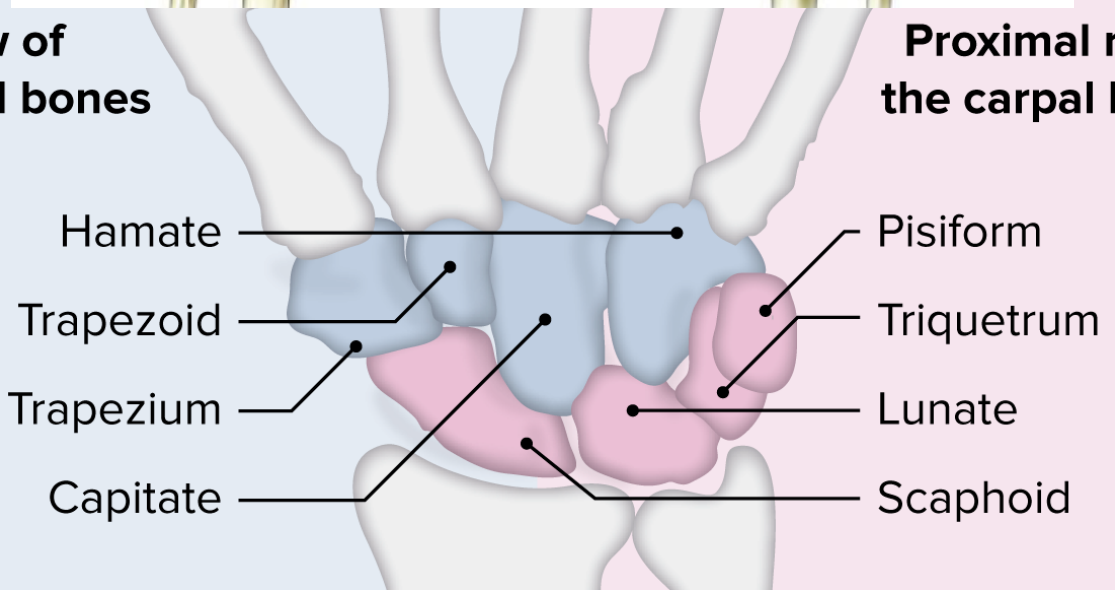

Lateral
Elbow X-Ray
ANATOMY
theRadiologist
Humerus
Anterior fat pad
Supracondylar ridge
Tuberosity
Radius
Neck
Head
Capitellum
Trochlea
Humeroradial joint
Coronoid Process
Humero-ulna joint
Olecranon
Ulna

BONES OF THE HAND AND WRIST

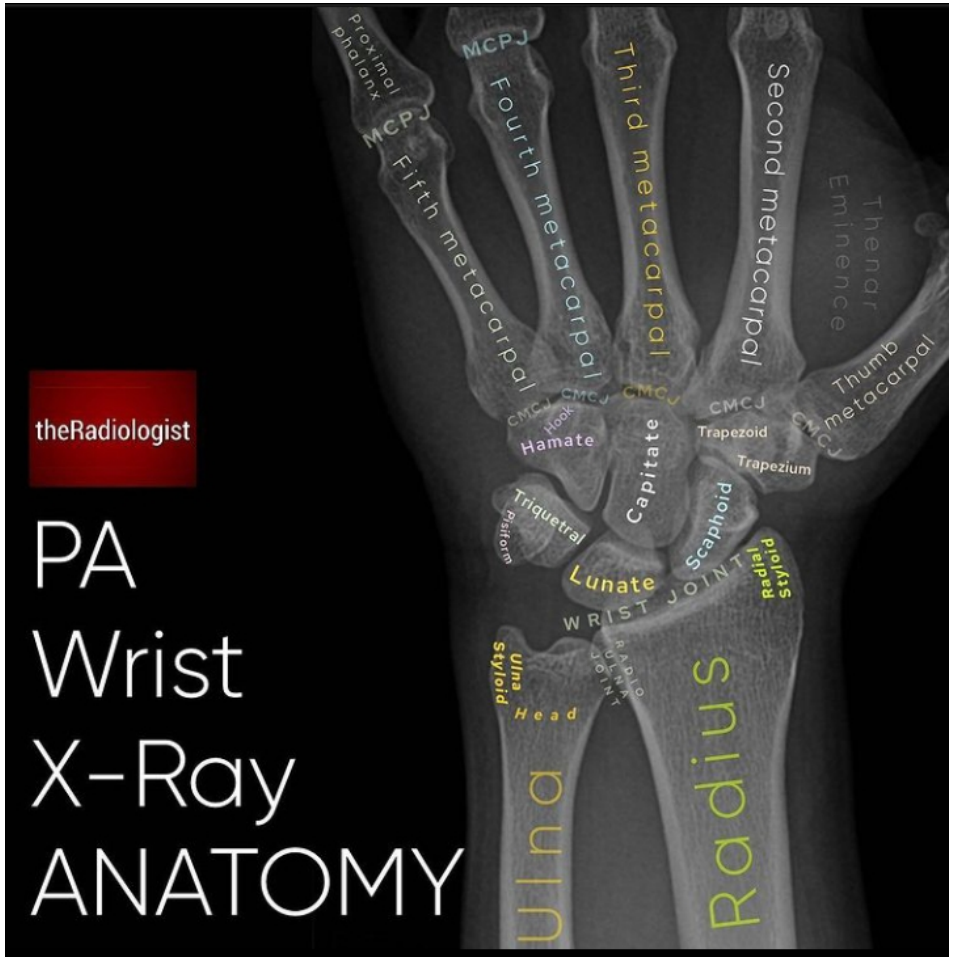


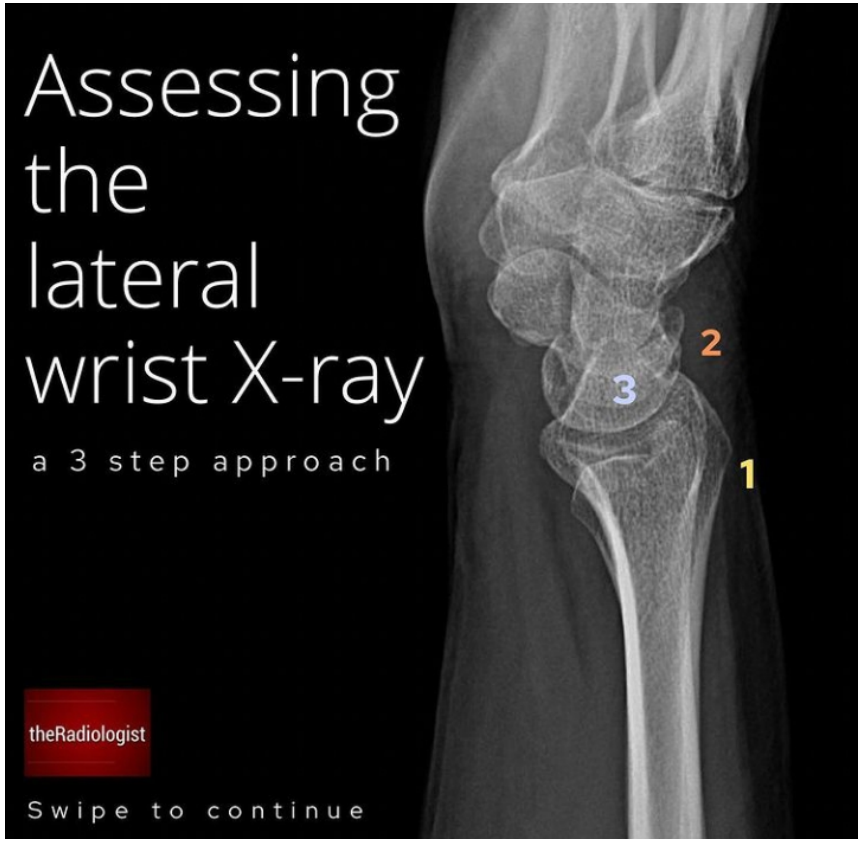
Distal row of the carpal bones

Proximal row of the carpal bones



- Important note : Memorize the names of the carpal bones

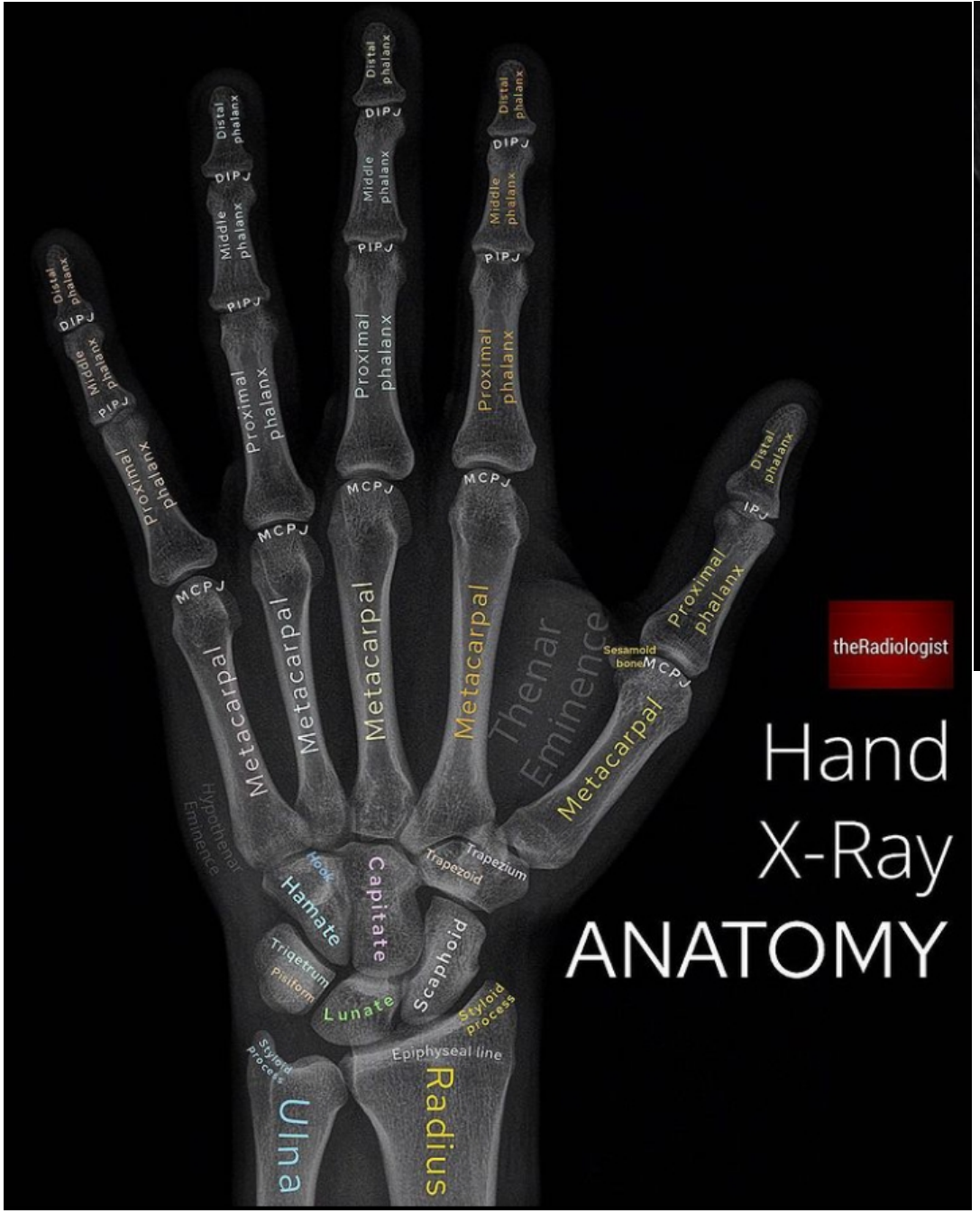


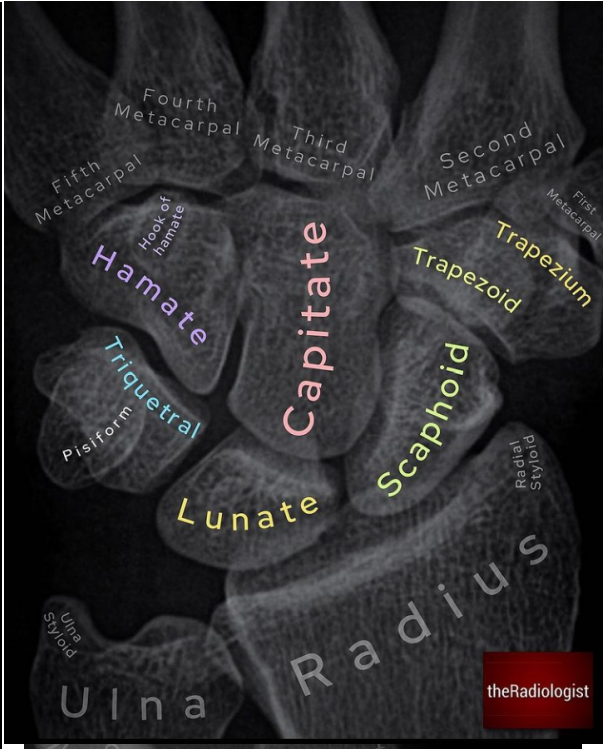


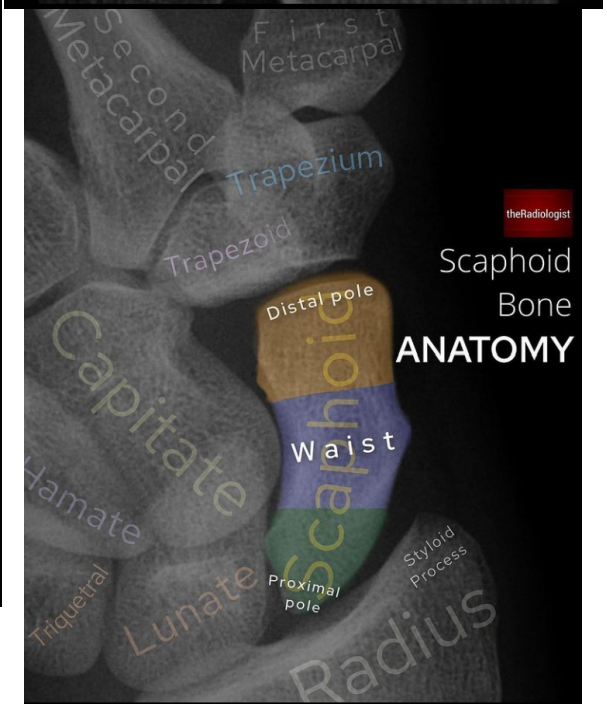
1---> Check the contour distal radius for any fracture

2---> Look for Triquetral bone fracture (Avulsed bony fragment)

3--> Check for any peri lunate dislocation(Associated with scaphoid fracture) of lunate dislocation

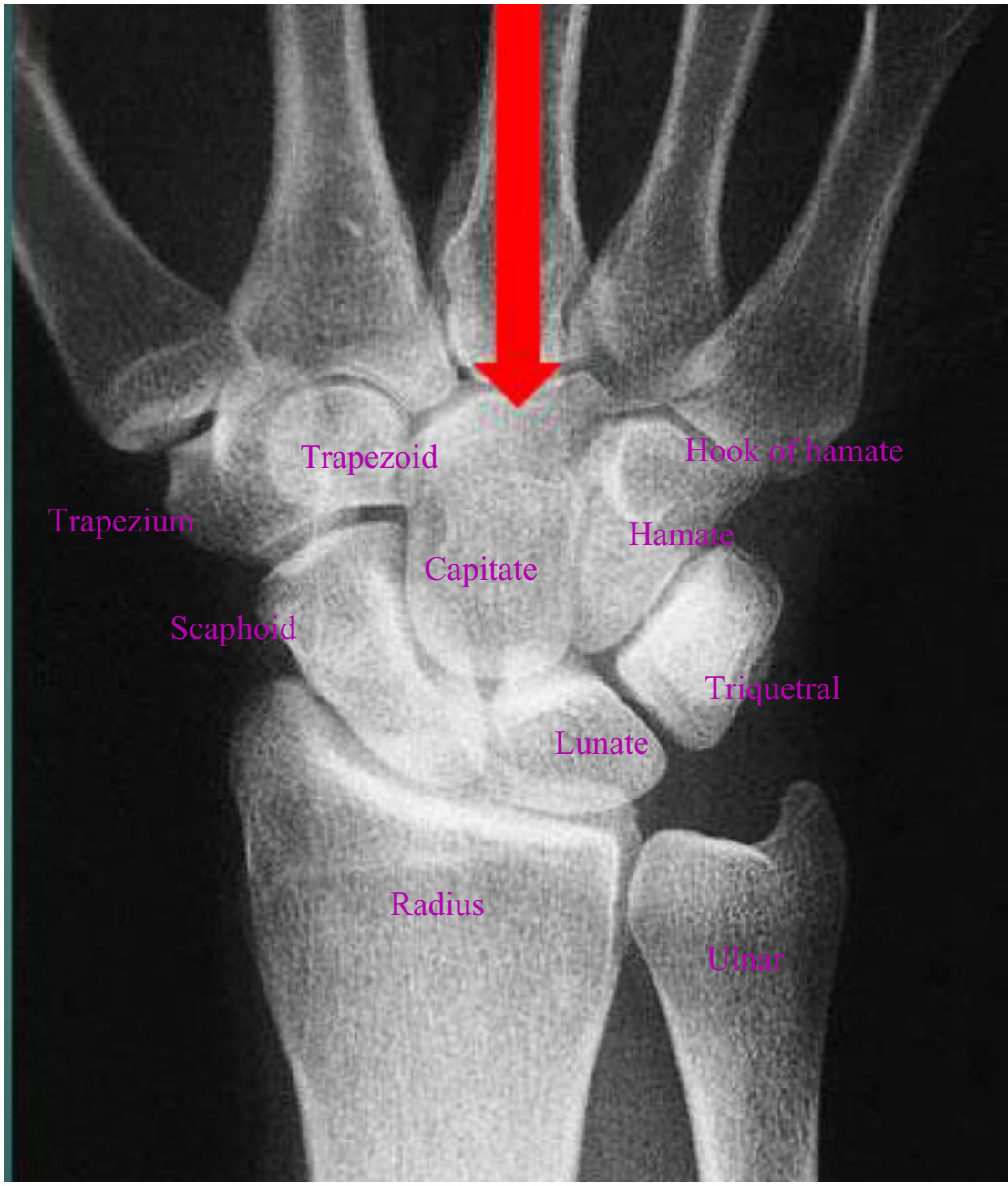

Distal phalanx
DIPJ
Middle phalanx
PIPJ
Proximal phalanx
MCPJ
Metacarpal
Thenar Eminence
Hypothenar Eminence
Sesamoid bone
IPJ
Hook
Hamate
Capitate
Trapezium
Trapezoid
Triquetrum
Pisiform
Lunate
Scaphoid
Styloid process
Epiphyseal line
Ulna
Radius
theRadiologist
Hand
X-Ray
ANATOMY


Fourth Metacarpal
Third Metacarpal
Second Metacarpal
Fifth Metacarpal
First Metacarpal
Hook of hamate
Hamate
Capitate
Trapezoid
Trapezium
Triquetral
Pisiform
Scaphoid
Lunate
Radial Styloid
Ulna Styloid
Ulna
Radius
theRadiologist


Second Metacarpal
First Metacarpal
Trapezium
Trapezoid
Capitate
Hamate
Triquetral
Lunate
Scaphoid
Distal pole
Waist
Proximal pole
Styloid Process
Radius
theRadiologist
Scaphoid
Bone
ANATOMY

What is the name of the bone pointed with the red Arrow?

Capitate



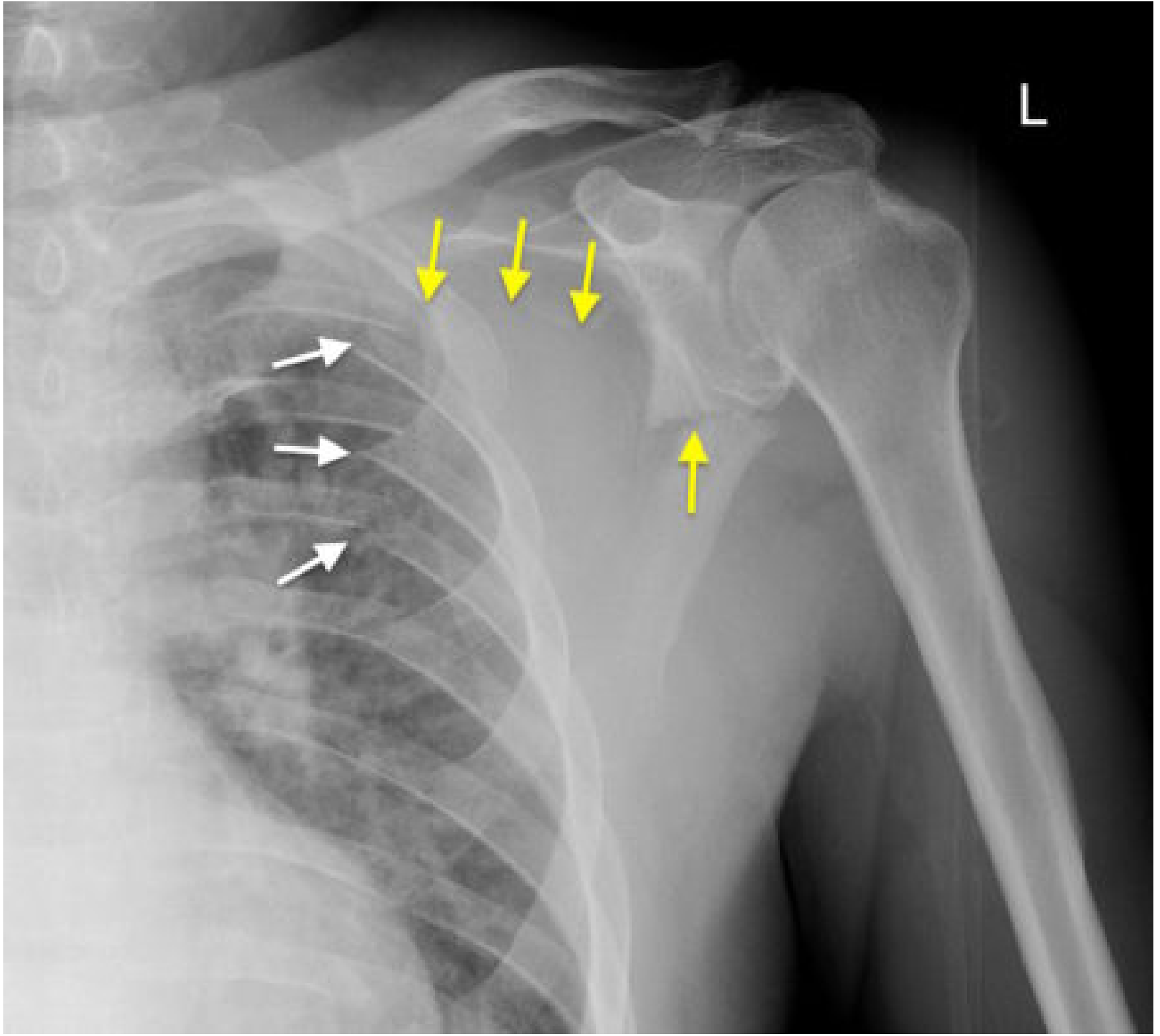
upper limb Fracture

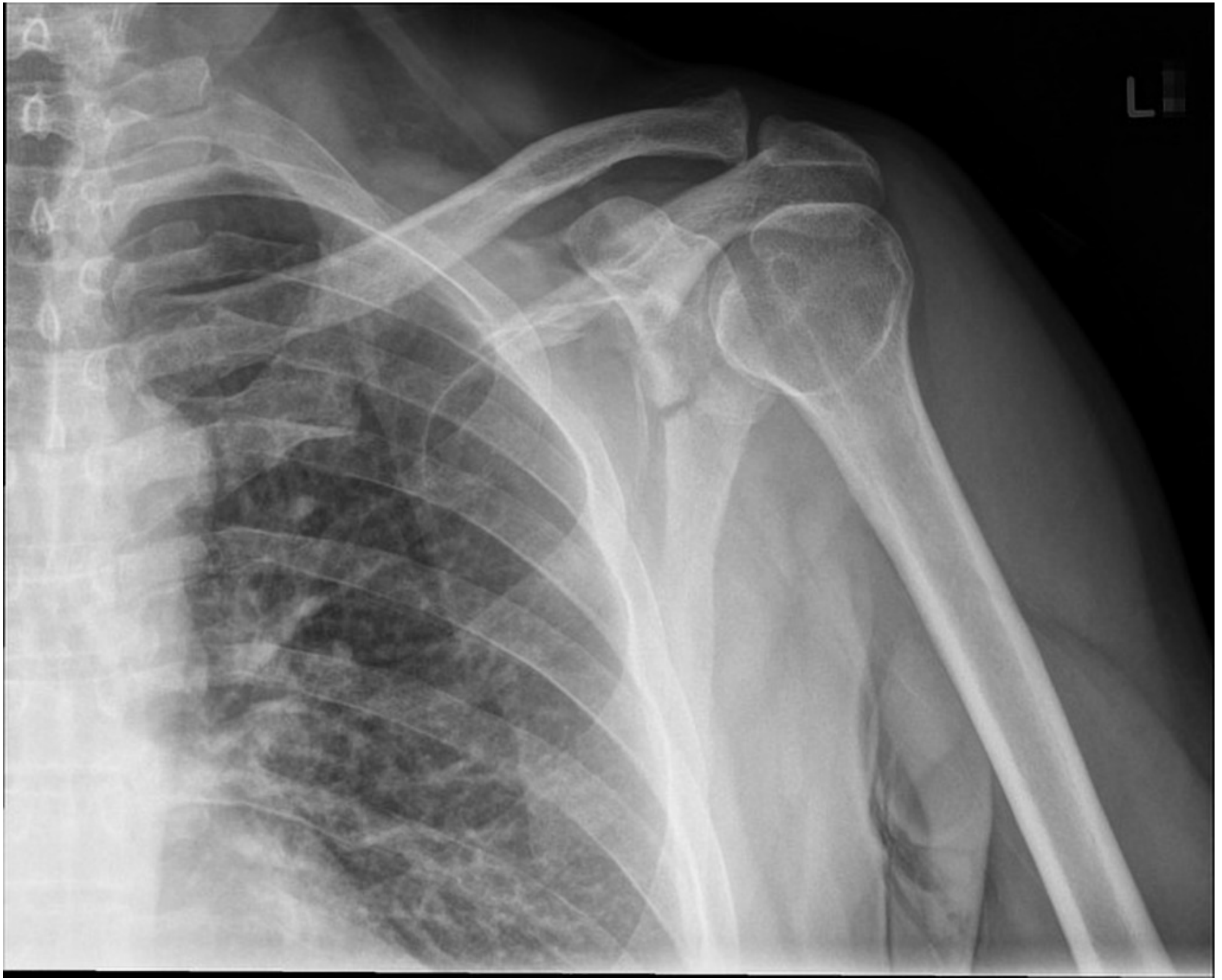
[1] clavicular Fractures

- mostly caused by direct Force to the shoulder as Falling & less commonly by Falling onto outstretched hand.
- MC site is Midshaft due to its charachterstics as it's the thinnest part & not reinforced by ligaments.
- occurs more in extreamly age & they come due to pain & inability to move their shoulder
- ttt: 1) analgesia 2) support the arm with sling or Figure-8 dressing & the healing will be around 6-8 wk
- prognosis is excellent with low-union rates & minimal Functional impairment but dislocation may occur
- in case of dislocation or shortening > 2cm, internal Fixation with plate & screw is done.

[2] scapular Fractures

- Uncommon as it's mobile & coated in muscle but the peak incidence is around 35-45 yrs.
- usually caused by RTA or very severe direct trauma to scapula but it could be indirect
- pt come with pain & adducted arm, However, most of them treated without surgery
- ttt: 1) immobilization with sling or shoulder immobilizer 2) analgesia
- in surgery cases:- Fixation of Fracture fragments with plates & screws & healing around 6-8 wks


L


L

[3] humerus Fractures

- divids into : a) humerus proximal Fractures b) shaft Fractures c) distal Fractures

- according to proximal :

- represents 5% of all Fractures & MC in elderly especially those with osteoporosis
- results From Fall on an out stretched arm especially in elderly but Following high trauma in young
- sometimes, associated with Nerve injury « axillary » leading to sensation loss in deltoid muscle & lat arm
  also, Flattened deltoid with abduction loss >15 deg
- arterial injury is uncommon
- Classified by Neer depending on the number & displacement of the segment
- the segments are : 1] greater & lesser tuberosity 2) anatomic & Surgical neck

Subject Date No.

Neer classification & tht

[1] if no structural displacement → part 1 → sling + short period of rest + excercise after 6 wks

[2] one part displaced or angulated → part 2 → closed reduction & Fixation for 3–4 wks

[3] if 2 parts displaced or angulated → part 3 → open reduction + internal Fixation + physiotherapy

[4] 3 part displaced → part 4 → open reduction + internal Fixation or prosthetic replacement.

- according to humeral shaft Fractures:

- Caused by trauma as Fall but it could be due to cancer in bone

- associated with radial Nerve injury leading to wrist drop (loss of extension & sensation)

- ttt: 1) supportive / hanging cast Followed by supportive splint & inFrequently require open reduction

- open reduction is required in:

1) non union 2) segmental Fracture 3) open Fracture 4) vascular injury 5) Brachial plexues injury


L
LT ARM&
ELBOW
AP/LAT

- according to humeral distal Fractures:-

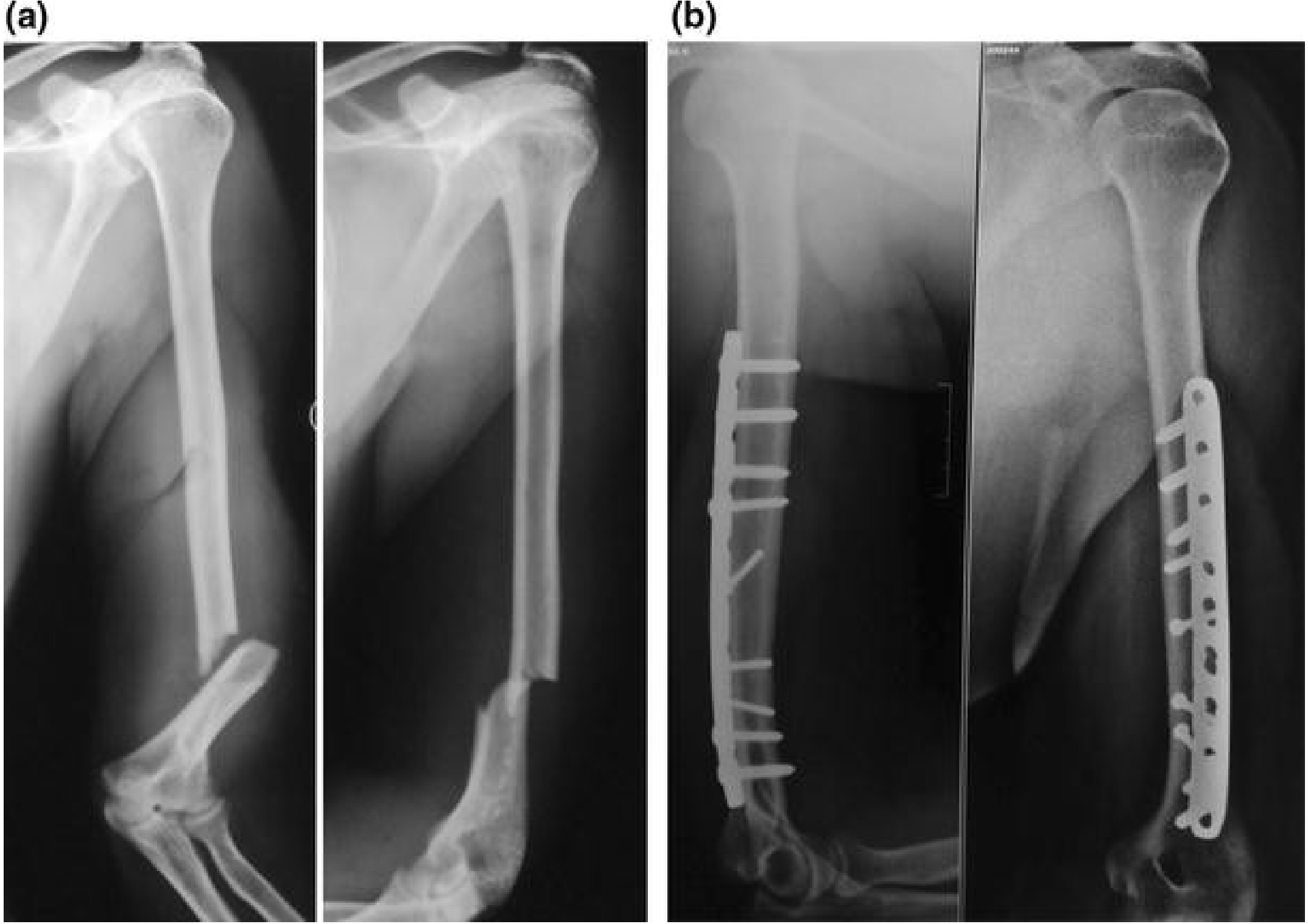
- MC in children & rare in adults

- occurs due to Falling From moderate height on a hyper-extended elbow

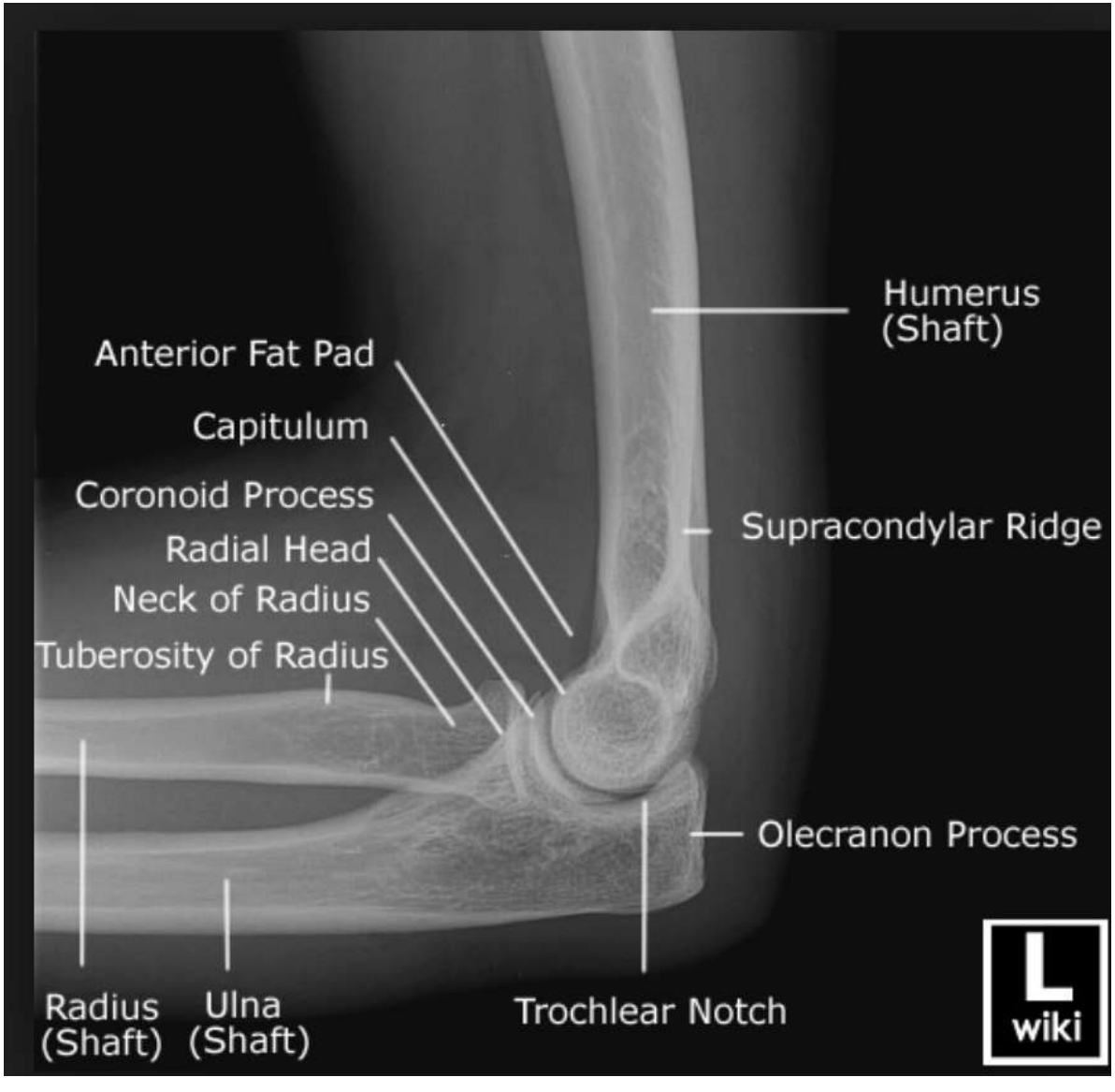
- associated with median Nerve injury leading to "Ape hand" ⇒ loss of wrist Flextion + Flextion of lateral Fingers + thumb opposition

- ttt : [1] open reduction & internal Fixation (plates & screws)

[immobolization of Flexed arm to 120 degree leads to ischemic (Volkmann) contracture]


(a)
(b)

Elbow joint


Humerus
(Shaft)
Anterior Fat Pad
Capitulum
Coronoid Process
Radial Head
Neck of Radius
Tuberosity of Radius
Supracondylar Ridge
Olecranon Process
Radius
(Shaft)
Ulna
(Shaft)
Trochlear Notch
L
wiki

Posterior Elbow Dislocation

- Named based n anatomic location of olecranon relative to humerus
- Resulted from fall onto outstretched hand
- May be associated with medial/lateral epicondyle injury
- Terrible triad : post dislocation + radial head fracture +coronoid process fracture
- Managed by analgesia & reduction

Proximal Fracture Of The Humerus X-Rays

Humeral Shaft Fracture

There are 3 types of distal humeral fracture:

1) Extra-articular supracondylar fracture
2) Intra-articular unicondylar fracture
3) Bicondylar fracture

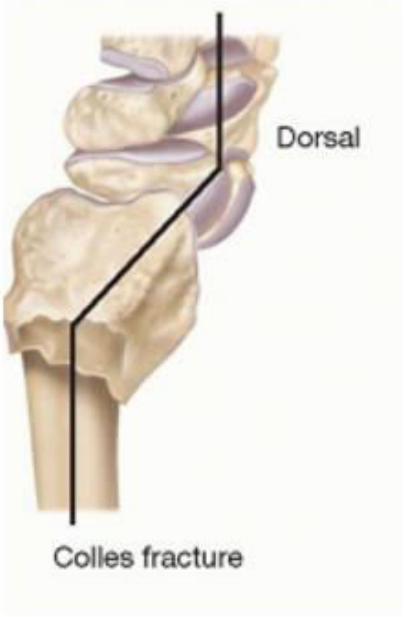
Bicondylar fracture

Humeral Intercondylar fracture Type 4

Wrist drop

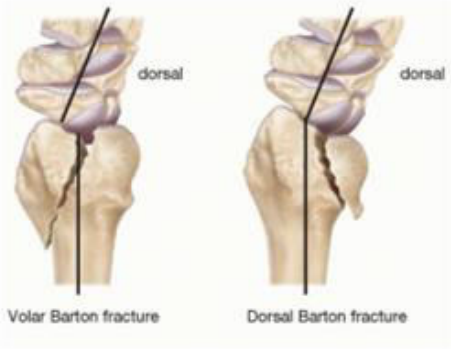
Supracondylar Fracture X-Ray

COLLE'S FX	SMITH'S FX	BARTON'S FX	CHAUFFEUR FX
• falling on **hyperextension** • **dorsal angulation** • **apex volar** • **dorsal displacement**	• falling on **flexed wrist** • **volar angulation** • **apex dorsal** • **volar displacement**	• Fx w\ either dorsal or volar displacement • the whole wrist displaces w\ the fractured piece	• Fx of the **radial styloid** • AP X-ray shows intact lunate facet *(unlike barton's)*



Colles fracture

Smith (reverse Colles) fracture



Volar Barton fracture Dorsal Barton fracture


Chauffeur's fracture palmer

Distal Radius Fractures

- **Barton's fracture** (rim fx.)- posterior rim fracture of distal radial articular surface with associated proximal dislocation of carpals
  - Will see overlap of proximal row with articular surface of radius
- **Chauffeur's fracture** (backfire fx., Hutchinson's fx.)- fracture of radial styloid
  - Caused by avulsion or impaction by scaphoid
  - Formerly caused by starting cars with hand cranks


http://radiographics.rsna.org/content/24/4/1009/F11.expansion.html


http://www.radiologyassistant.nl/en/476a23436683b

Subject Date No.

(4) scaphoid Fractures

- MC injury in carpal bone injuries & seen in young adults (M>F) Following Fall on outstretched hand
- Mostly stable but in unstable Fractures, there's disruption of scapho-lunate ligament & lunate dorsal rotation
- vascular injury may occurs leading to AVN + nonunion + pt comes with pain & swelling

[relative sclerosis of proximal Fragment is pathognomic of AVN]

- ttt:- in general ⟹ they dont need splintage + treated as a wrist sprain

[1] undisplaced Fractures:- No need For reduction & treated in plaster the cast is applied From Forearm to metacarpophalangeal joints but incorporating the proximal phalanx of the thumb. the wrist is dorsiflexed & the thumb Forwards in glass holding position. For 8 wks

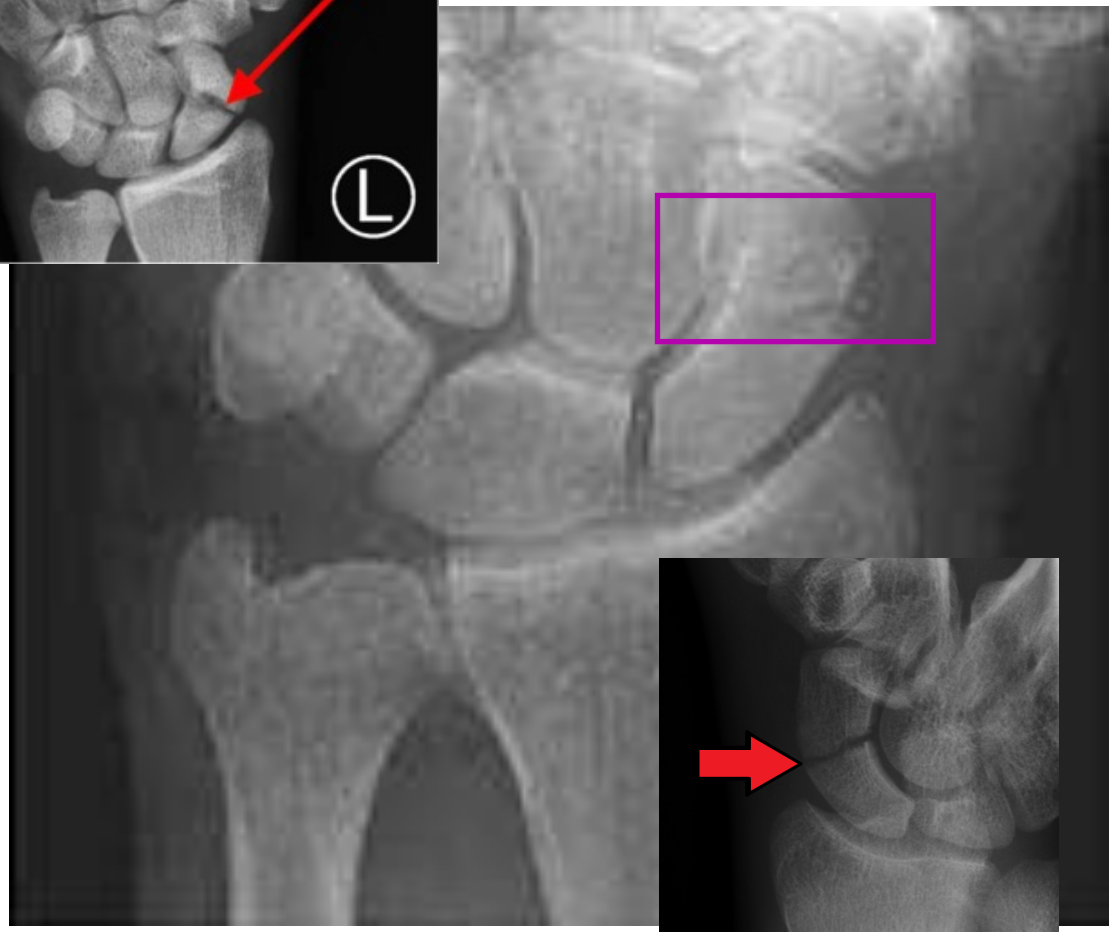
[2] displaced Fractures:- treated in plaster but with less predictable outcome

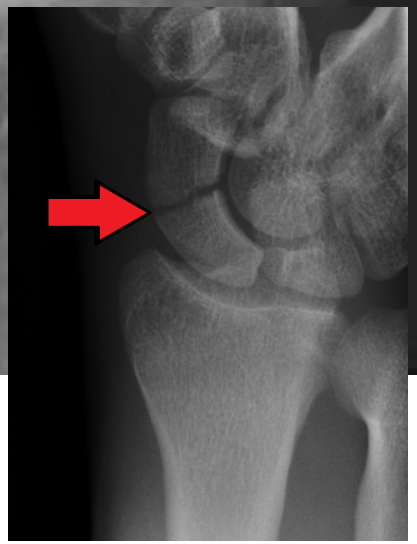
so, it's better to reduce the Fracture openly & to Fix it.

and then after 8 wks, the plaster is removed & the wrist is examined clinically & radiologically

- **Dx?**
  Scaphoid fracture

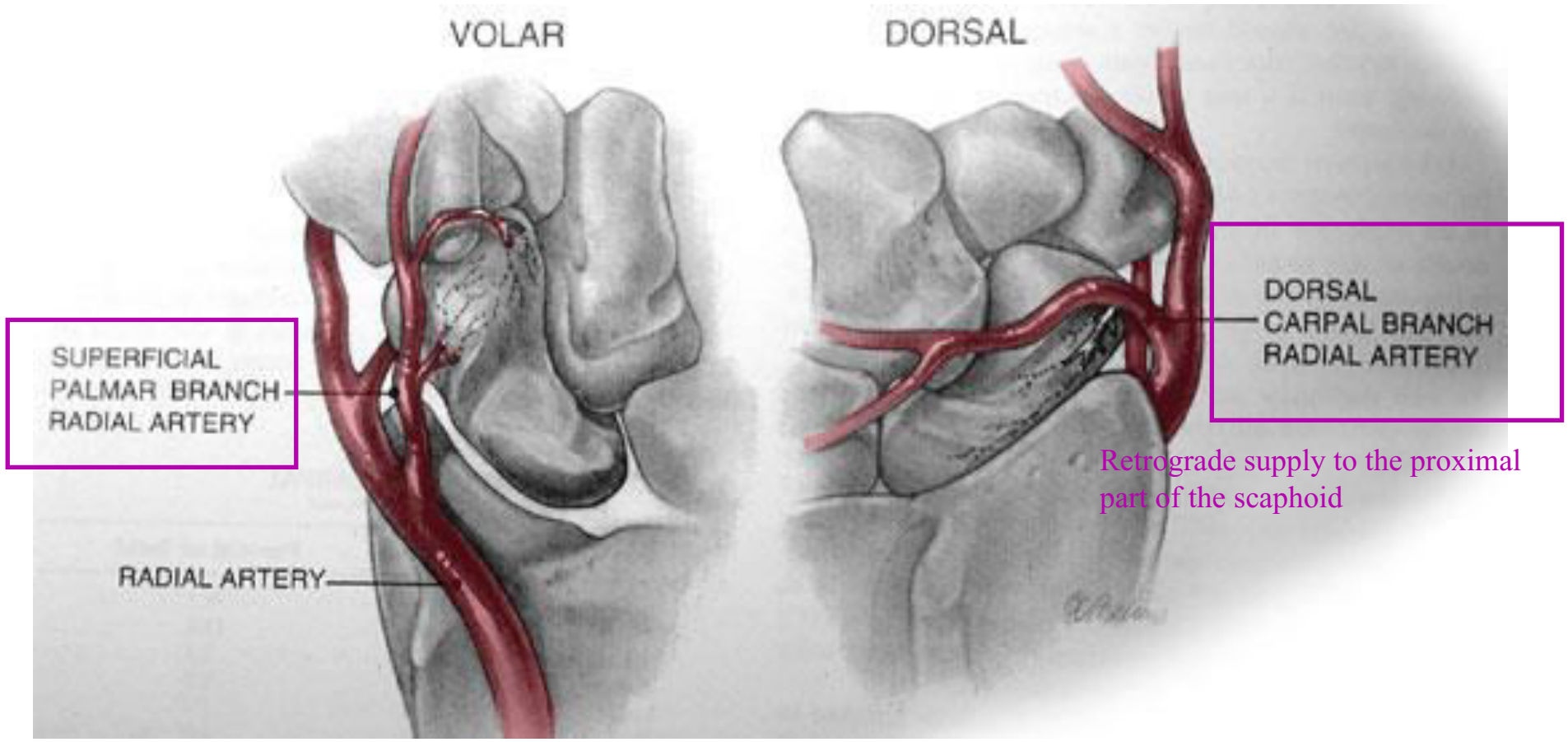
- **Complication:**
  AVN





Scaphoid blood supply:

- Dorsal carpal branch (branch of radial)
- Superficial palmar arch (branch of volar radial)



(5) lunate Fractures

D rare & occurs due to wrist dorsiFlextion injury & thus there's risk of concussion

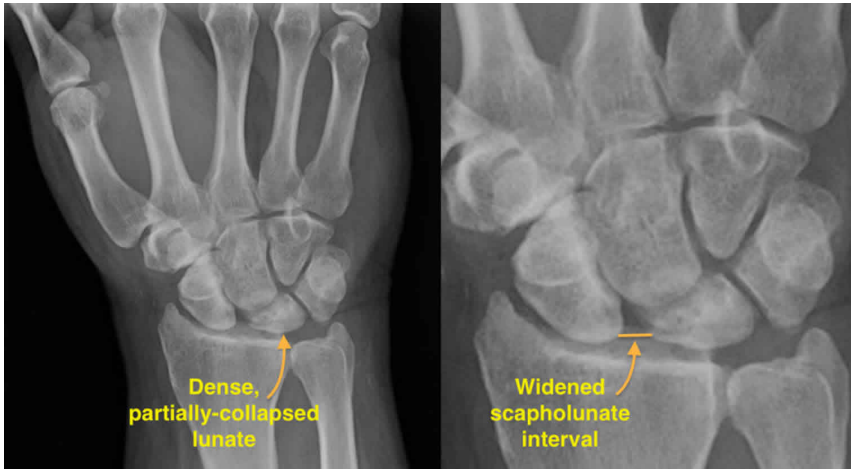
- associated with kienbock's d2 [AVN]

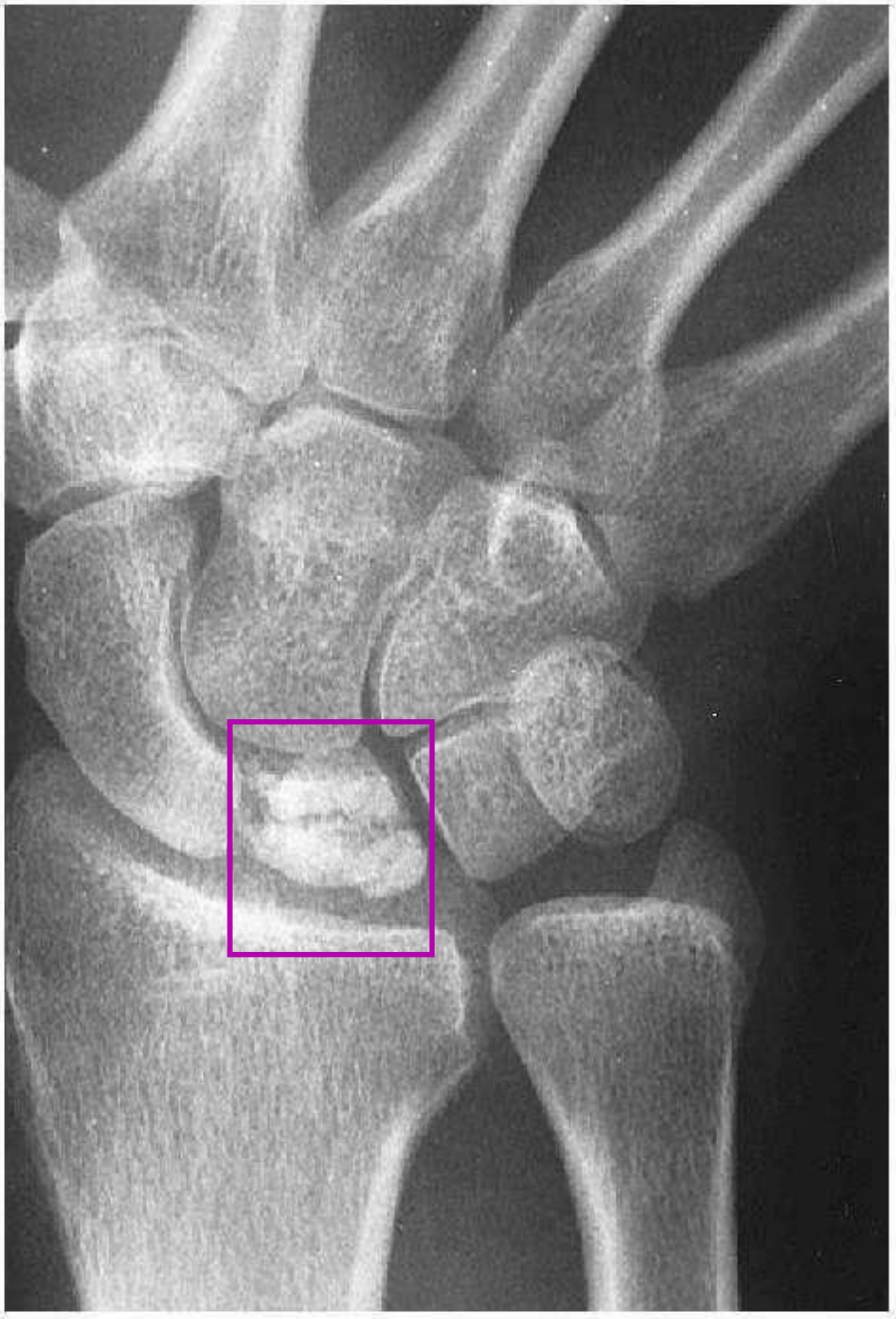
- undisplaced → immobolise in cast for 6 wks displaced → reduce & Fix with screw

Dx?

Kienbock's disease (AVN of the lunate – lunate density)

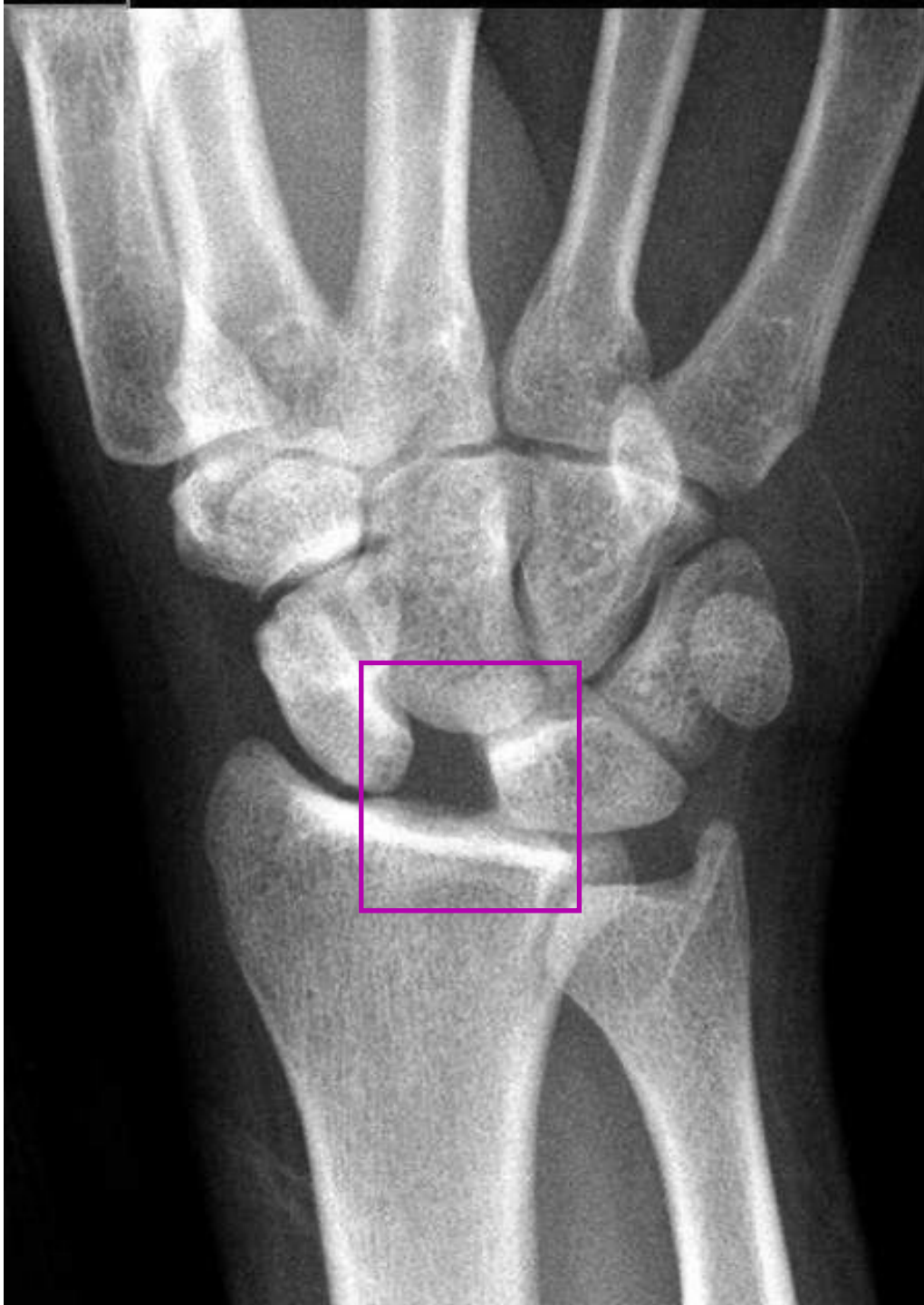
Kienbocks


Dense, partially-collapsed lunate
Widened scapholunate interval



Dorsal intercalated segmental instability (DISI)

widening of scapho-lunate interval
(Terry-Thomas Sign)



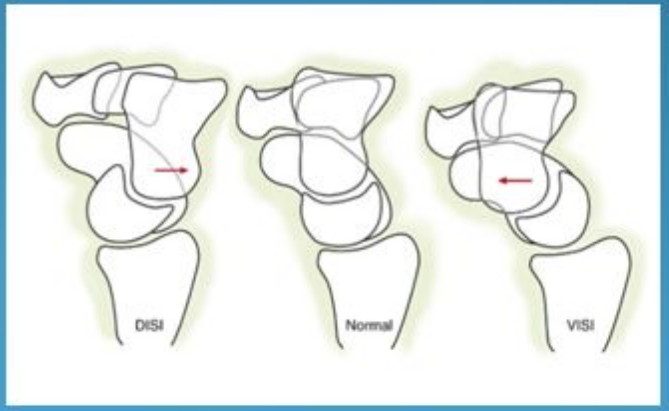
Dorsal and Volar intercalated segment instability (DISI & VISI)

Normal tendency of scaphoid to flex and triquetrum to extend, is kept under check by lunate as an intercalated segment keeping the proximal row bones together and balanced

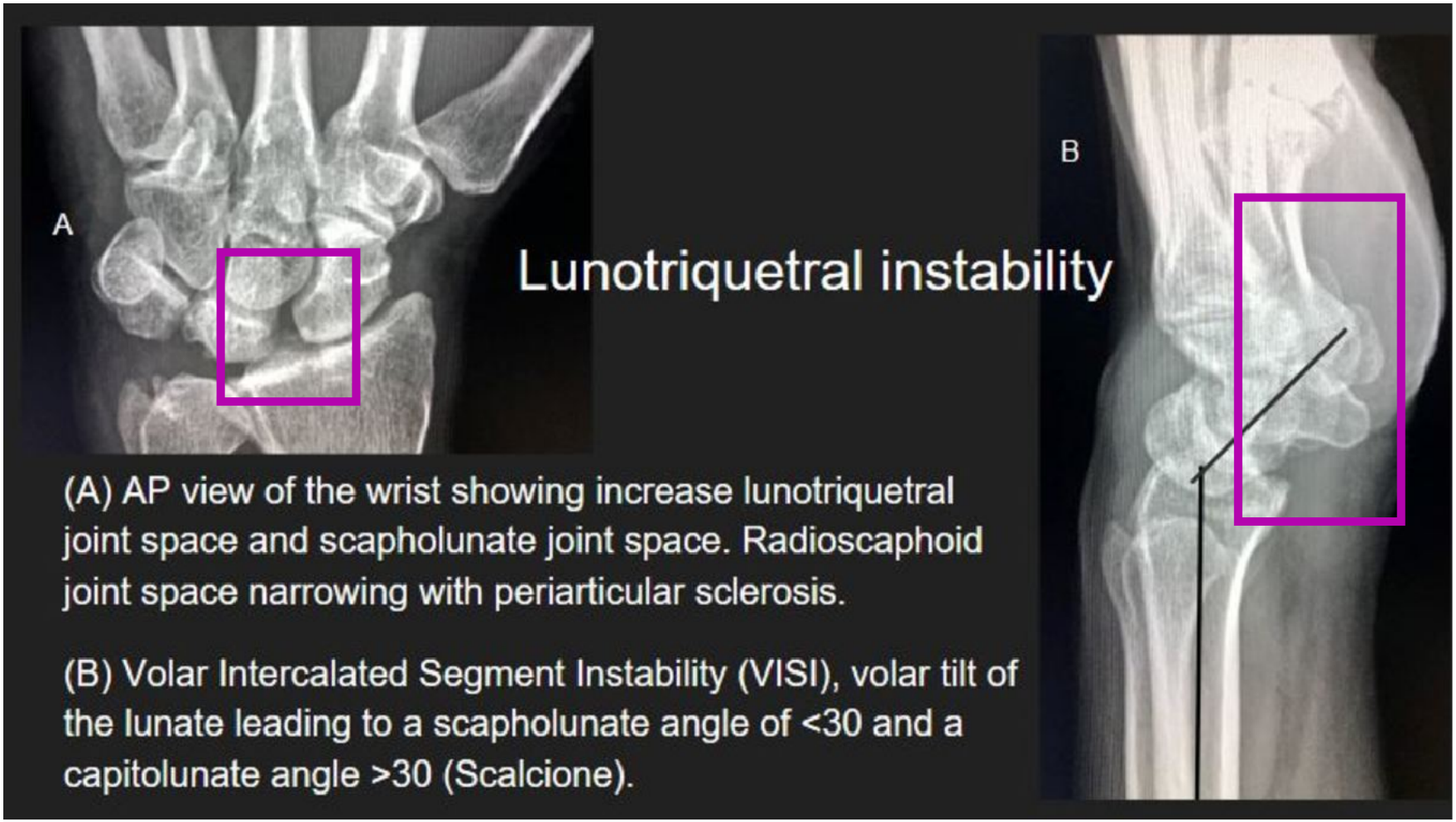
Rupture of lunate's link with either of its neighbor results into:

DISI – SL ligament fails
Scaphoid flexes
Lunate extends with Triquetrum

VISI – LT ligament fails
Triquetrum extends
Lunate flexes with Scaphoid



Lunate goes with the good guy


A
B
Lunotriquetral instability
(A) AP view of the wrist showing increase lunotriquetral joint space and scapholunate joint space. Radioscaphoid joint space narrowing with periarticular sclerosis.
(B) Volar Intercalated Segment Instability (VISI), volar tilt of the lunate leading to a scapholunate angle of <30 and a capitolunate angle >30 (Scalcione).

VISI On Xray

[6] metacarbal base Fractures

[1] base of 2nd & 3rd metacarbal ⟹ stable unless IF there is angular deformity

↳ Check For correct rotation then apply volar slab From Forearm to proximal Finger joint

[2] base of 4th & 5th metacarbal ⇒ more painFul → reduced by traction on the little Finger and then held with a compression screw

[3] base of the thumb

1) impacted Fracture 2) bennett's dislocation 3) Rolando's Fracture

Subject Date No.

[1] impacted :-

IF <30 → plaster cast From Forearm to the Interphalangeal thumb joint with Fully thumb abduction & extention

IF >30 → open reduction

[2] bennetts

unstable + obliquely extends into CMC joint + reduced by traction but hard to keep in positione + Fix the Fracture with simple percutaneous wire or screw.

[3] Rolandos

intra articular comminuted Fracture with T or Y configuration.

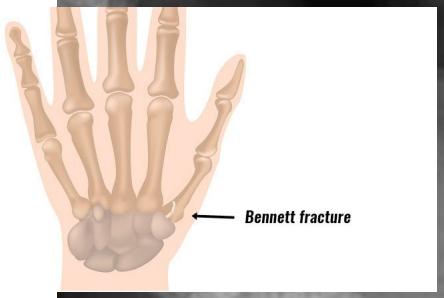
closed reduction & K wiring # open reduction with plate Fixation

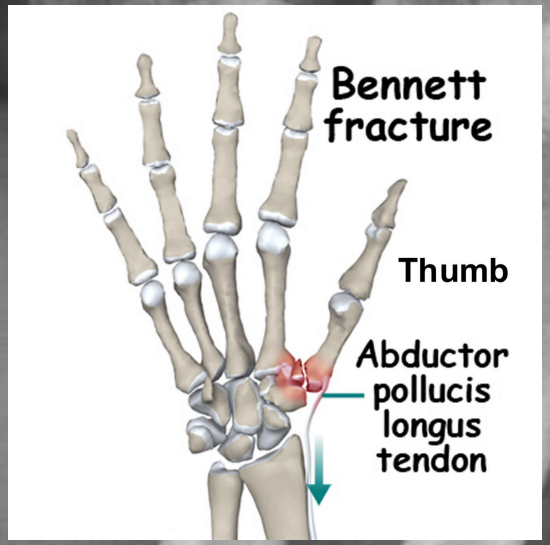
Dx? Bennets fracture

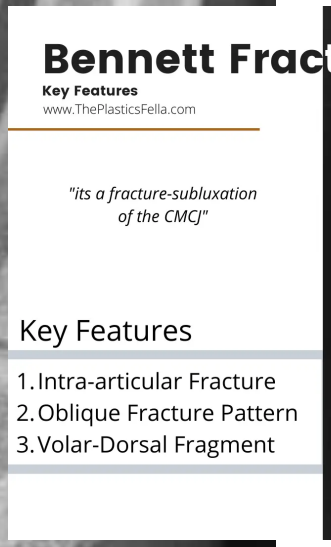
(**Bennett fracture** is a **fracture** of the base of the first metacarpal bone which extends into the carpometacarpal (CMC) joint)

Intraarticular fracture

Tx: 2 Pins







a three-part or comminuted intra-articular fracture-dislocation of the base of the thumb (proximal first metacarpal).

Dx? Rolando fracture

" Comminuted bennet fracture "

Metacarpal

(comminuted fracture of the base of the 1st ~~phalanges~~)

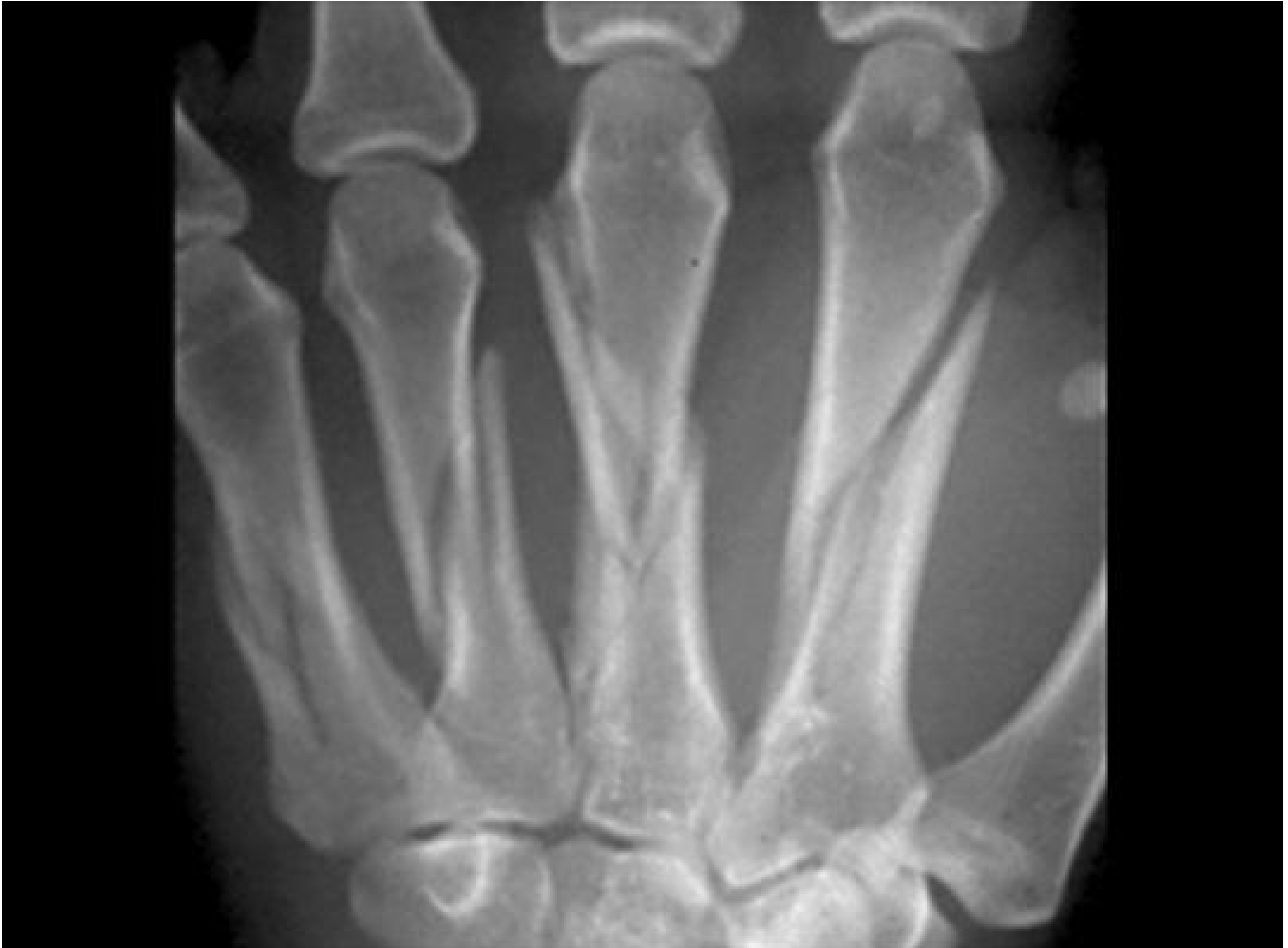
Tx : Plates and screws

[7] metacarpal shaft Fracture

- transverse & associated with skin damage but may come as oblique Fractures
- mostly due to direct blow Force.
- ttt: (1) with slight displacement → crepe bandage with active movement.

(2) transverse with significient displacement → reduction by traction & pressure & plaster slab

(3) spiral Fractures → must be reduced by screws or plate or percutaneous wire



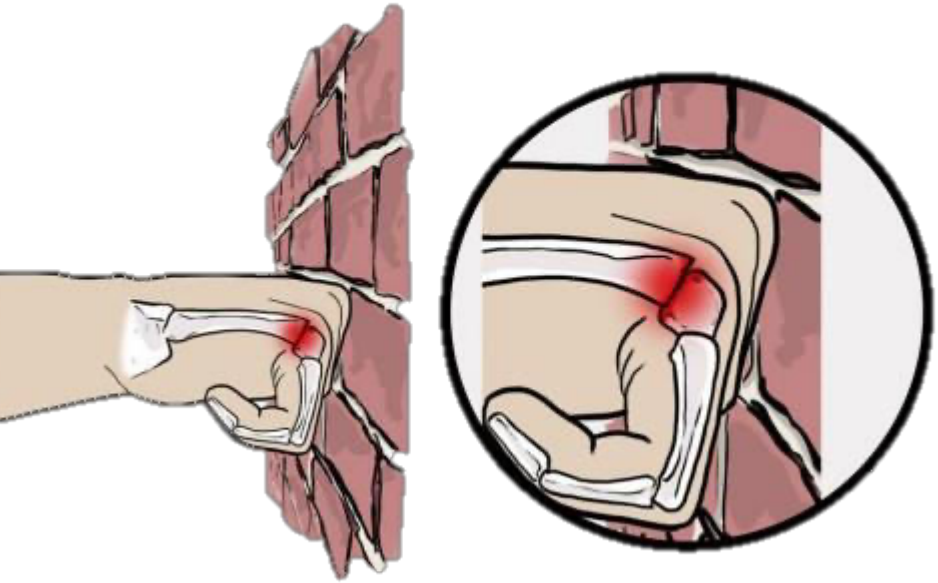
[8] metacarpal Neck Fracture

- occors in all oF metacarpal but MC in 5th one + called boxer's Fracture.
- x-ray shows impacted transverse Fracture + volar angulation oF distal Fragment

Boxer's Fracture

* break in the neck of the 5th metacarpal mostly *

Little finger



[9] metacarbal head Fractures

- occurs after direct blow + considered as comminuted and sometimes open

- operative reduction + Fixation with small headless buried screw


R
RED DOT

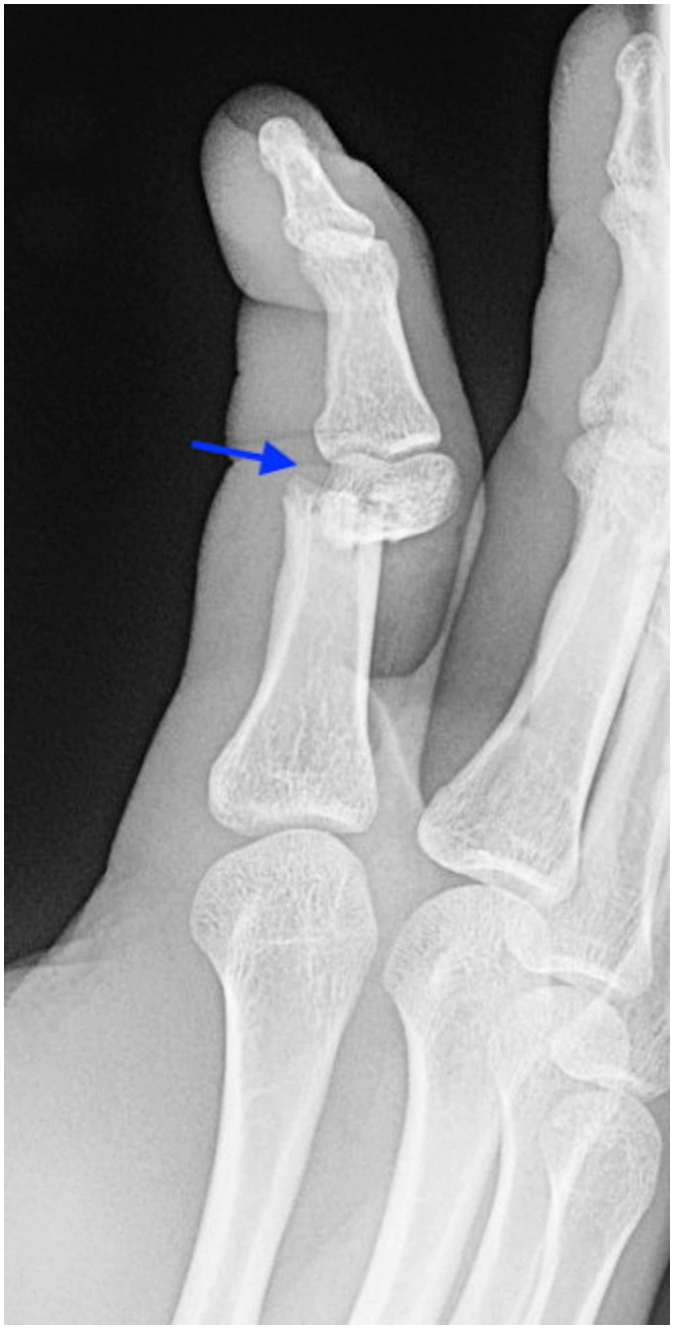
[10] phalangeal Fractures

[A] proximal & middle shaft.

- transverse Fracture with Forward angulation
- spiral Fracture From twisting
- comminuted Fracture From crush injury.
- metaphyseal Fracture From osteopenia
- intra articular Fracture at distal end of phalynx usually.
- ttt:

(1) displaced → straightened + local anesthesia

(2) undisplaced → Functional splintage



[I] Terminal phalanx Fracture

[A] tuft Fracture:

① caused by hammer blow causing shattering bone

② ttt by controlling the swelling + regaining movement + drainage of hematoma

[B] Mallet Fracture :-

[] it could be 3 types :-

(a) avulsion of the most distal part of extensor tendon

(b) avulsion of small Flake of bone From base of terminal phalanx

(c) avulsion of large dorsal bone Fragment, by subluxation of TIP joint

ttt by immobilisation of Tip using mallet-Finger splint +

Subject Date No.

in case of bone avulsion → For 6 wks

in case of tendon avulsion → For 8. wks continuosly then only night For 4 wks

Mallet Finger injury

[12] carpo metacarpo dislocation

- MC affected is thumb +++ by traction & hyper pronation

Carpometacarpal dislocation

[13] metacarpo phalangeal dislocation

- usually thumb affected

Metacarpophalangeal dislocation

[4] interphalangeal dislocation

- proximal joint MC affected + ttt by ~~reduction~~ pulling
- it takes many months for spindle like swelling of the joint to settle & for full extension to recover

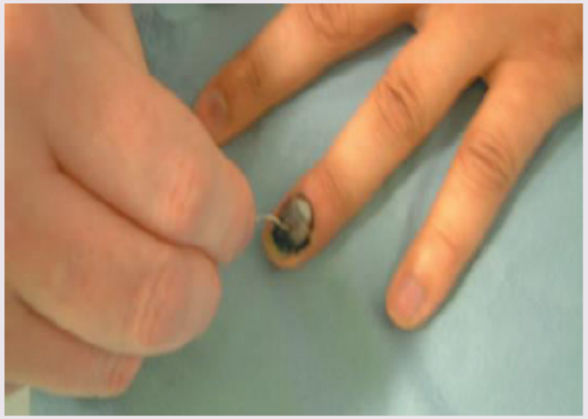
[5] interphalangeal joint dislocation

- easily reduced & easily missed if nd x-rayed

Dx?

Distal interphalangeal joint dislocation

A fracture of the tuft



subungual hematoma

Proximal interphalangeal joint dislocation

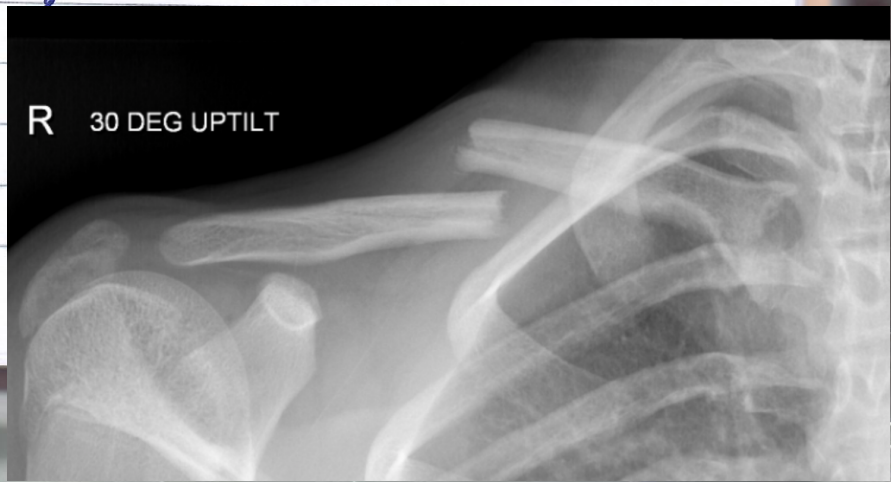
ULF

① Clavicular fractures

- Mechanism of Injury.
  - → Falling on open Hand
  - → direct Blow Hit on shoulder.
- Classification
  - ① lateral 1/3
  - ② medial 1/3
  - ③ middle 1/3 shaft ← most common type

because (A) it's the thinnest Part.
(B) not connected to muscles.

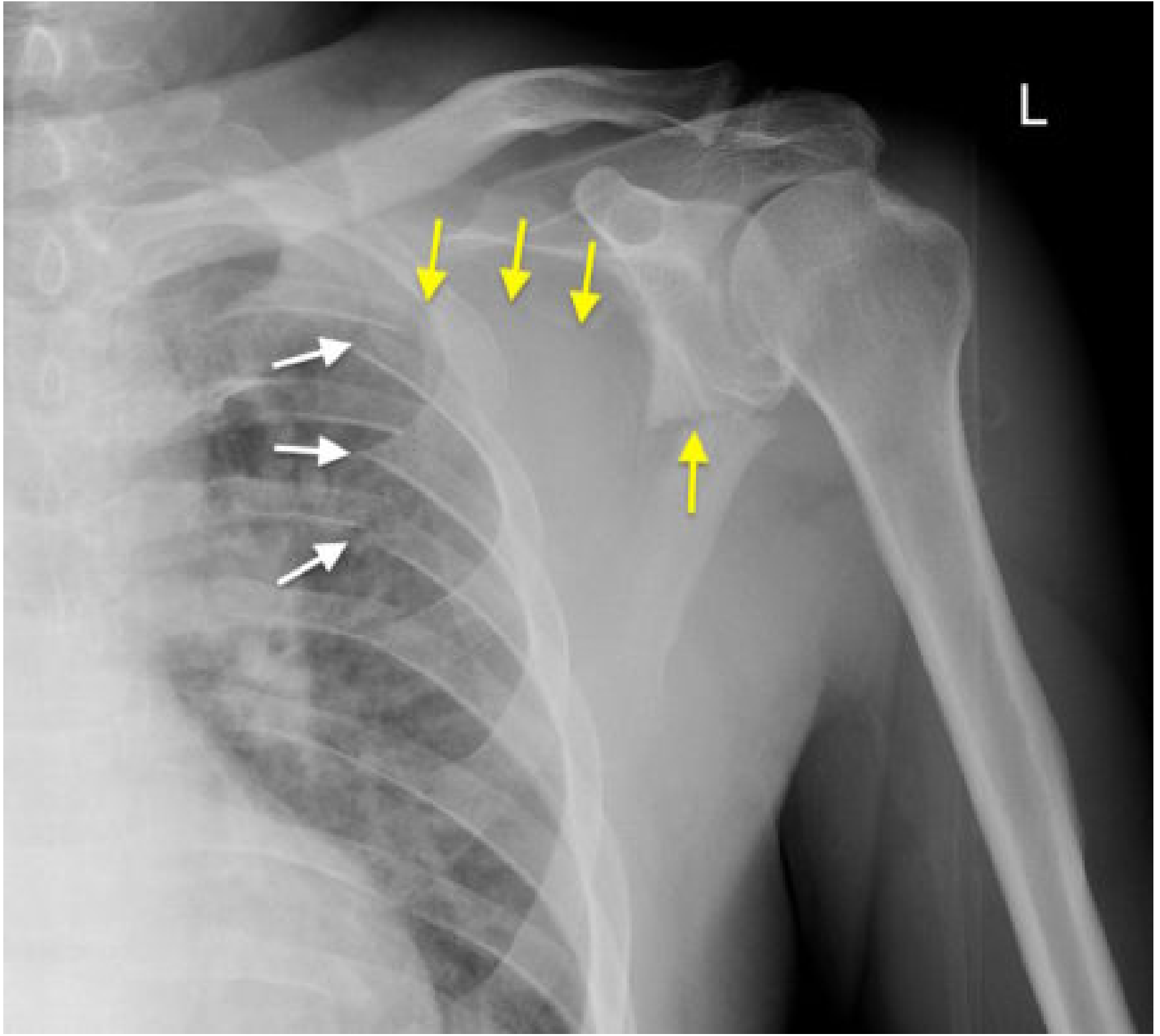
- clinical Presentation
  - → come with affected hand on his chest, and lump Present on the middle clavicular.
  - → check for neuro Vascular exam for any complication.
- X-ray
  - -AP and axial
- Mangement → Immobalisation
  - ① Broad arm sling → يلبس لمدة for 6-8 weeks.
  - ② figure of 8 clavicel Brace
  - ③ Internal fixation (ORIF) →
    - (A) significant displacment. ← ازاحة
    - (B) angulation.
    - (C) shortning >2cm.
    - (D) Patient at Risk of non-union (elderly)
- complication
  - ① neuro Vascular Injury (axillary N., subclavian a.)
  - ② Pulmonary Injury.
  - ③ mal union, non union.

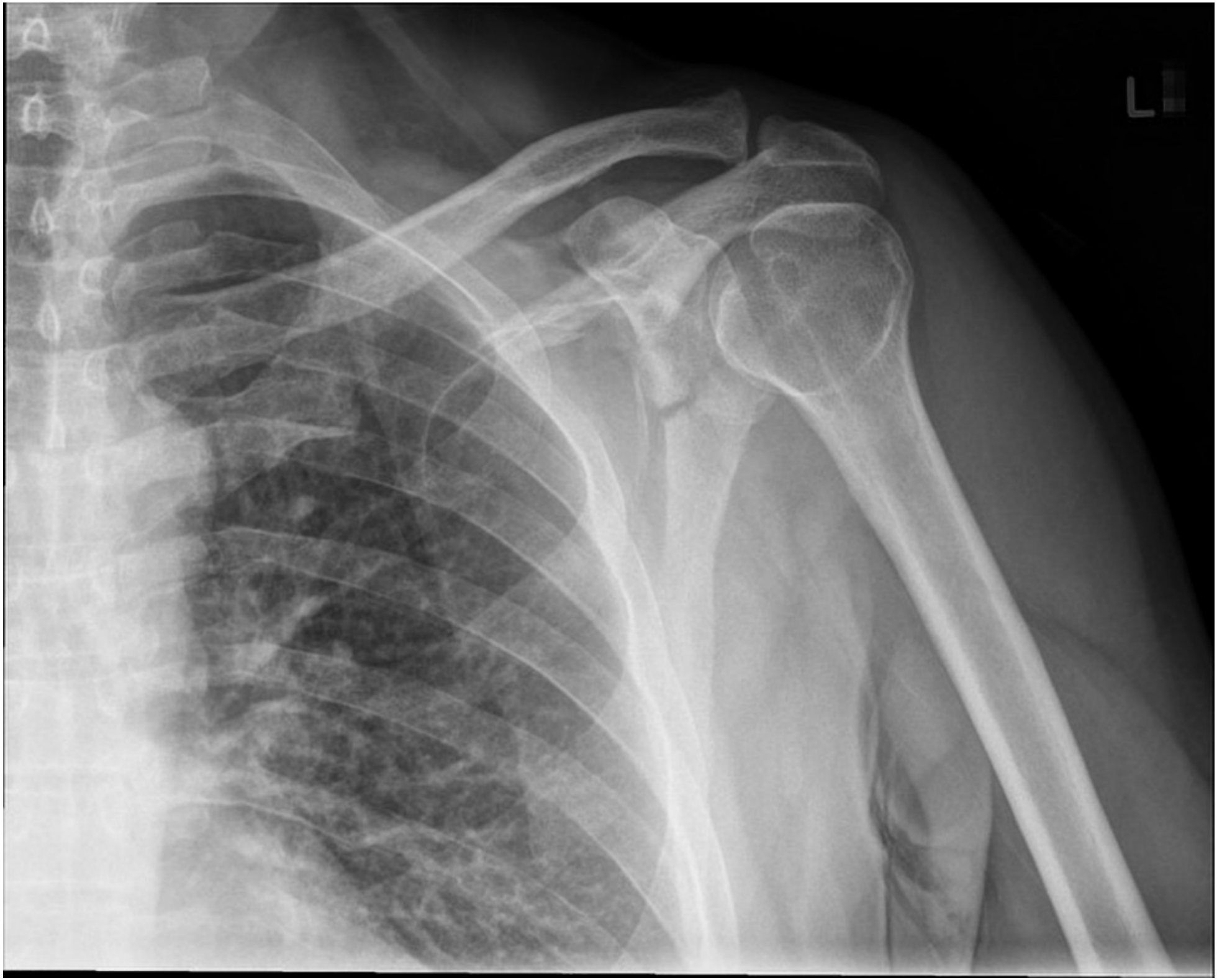


② scapular fracture.

- Mechanism and classification (High energy fracture)
  - ① scapular Body fracture → by direct Blow on scapula
  - ② Glenoid neck fracture → by direct Blow or falling.
  - ③ acromion Process fracture → by direct Blow.
  - ④ Coricoid Process fracture → " " "
  - ⑤ Glenoid surface fracture → by " " or dislocation of shoulder
  - → or by RTA

- clinical Presentation
  - → come with affected arm on chest, and Brusies on the shoulder and chest
  - → neuro vascular should be done
- ~~X~~ Imaging
  - → X-ray not that helpful
  - → CT-scan is the best tool for Image.
- Mangment (Immobalization)
  - → depend on the type
  - ① +② → Conservative + arm sling
  - ③ → If dis Placed → OP
  - ④ + ⑤ → OP If dis Placed
- Indication of surgery
  - Ⓐ fracture fragments Involving the shoulder Joint.
  - Ⓑ additional fracture of the clavical.
- Complication
  - ① another fracture (clavical, head, ribs, etc...
  - ② Vesicral Injury
  - ③ arterial and nerve Injury


L


L

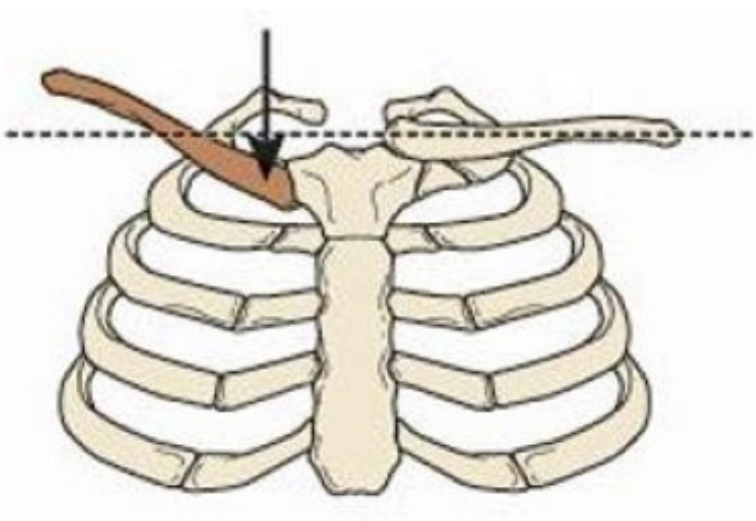
③ acromio clavicular dislocation.

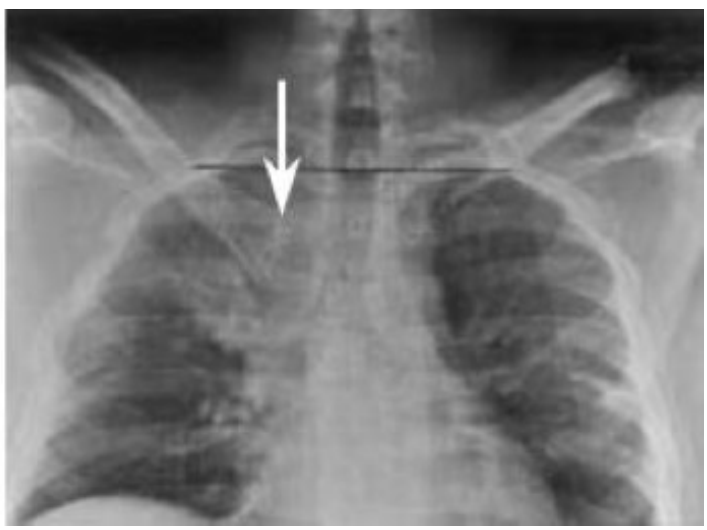
- Mechanism
  → falling down on abductor arm.
- Presentation
  → come with hand/arm on Chest, with Prominent lump on clavical area.
  → neuro vascular exam.
- X-ray
  → AP, axillary, cephalic tilt.
- Mangement
  → Conservative,
  → OP If the JOP need a clavical strength
- Complication
  ① neuro vascular Injury.
  ② rotator cuf Instability.
  ③ stiffness.
  ④ late osteo arthritis.

④ sterno-clavicular Joint dislocation

- mechanism
  - High energy trauma, like RTA
- Presentation
  → Painful bump on medial aspect of clavical Bone
  → the Patient come with cc of complication, such SOB or dysphagia due to tracheal compression, veinus congestion due to veinus compression, neuro vascular damage, Pheumothorax.
- AP and serendipity X-ray + CT is the choice
- Mangment
  - reduction under GA + figur of 8 sling.

Five Apple





⑤ anterior shoulder dislocation

- Mechanism
  - falling on abducted arm and external rotated
- Presentation
  - → come with arm on chest → Painfull limb
  - → straight lateral shoulder. → neurovascular exam.
- Xray → AP + lateral view
  - → overlap between glenoid surface and heumerus head.
  - → we will see 2 lesions: ① Bankert lesion
    ② Hill-sach sign

① Hill-sach sign
- due to recurrent shoulder dislocation
- appear as superior posterio lateral humeral head depression.

② Bankert lesion
- lesion on the anterior part of glenoid labrum of the shoulder.
- the cause: recurrent shoulder dislocation.
- on CT: find damaged glenoid labrum

- mangement
  - reduction under GA
  - after reduction, ① neurological exam for axillary N. should be done (abduction ~~+ adduction~~) and vascular exam
  - ② X-ray to check for re-dislocation after reduction.
  - ③ Broad sling for ~~2~~ 3 weeks

- Complication
  - Ⓐ Rotator cuff Injury.
  - Ⓑ fracture dislocation.
  - Ⓒ neuro vascular Injury.
  - Ⓓ recurrent dislocation.
  - Ⓔ un reduced dislocation.

Hill-Sach Sign

Cause: recurrent dislocation

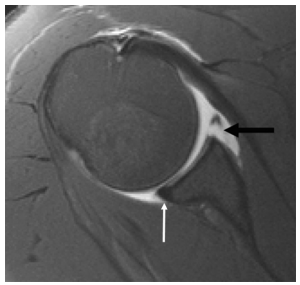
Bankart Lesion

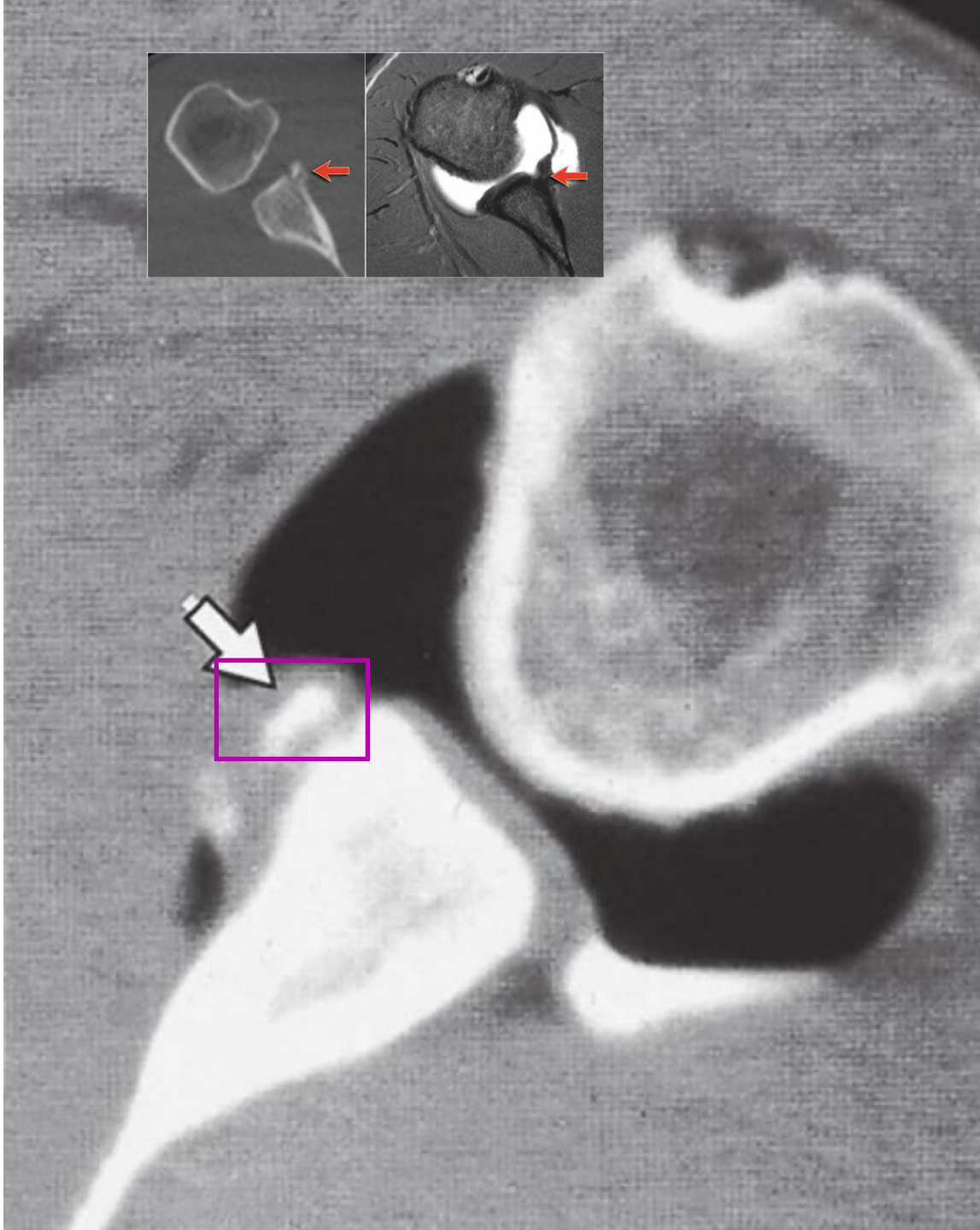
lesion of the anterior part of the glenoid labrum of the shoulder.

CT scan: damage to glenoid labrum

Cause: recurrent dislocation

MRI Bankart Lesion (Look at the bone color)



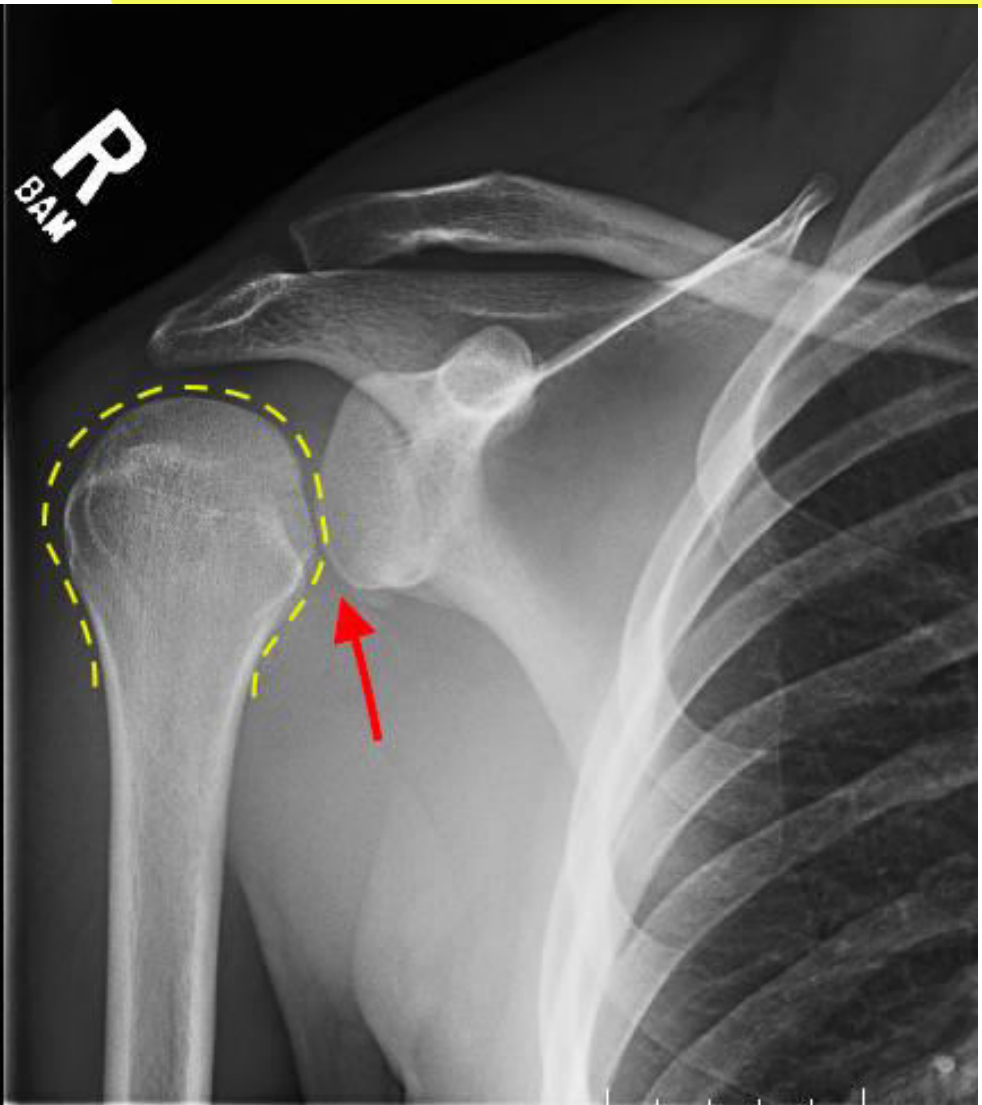


⑥ Posterior shoulder dislocation

- Mechanism
  - falling on adducted + Internal rotated arm. (دكتور ال conf.)
  - falling on flexed + adducted arm (لكم كوعه)
- Presentation
  - Internal rotated
  - Painful arm
  - straight lateral shoulder
  - Prominent coricoid Process.
- Xray
  AP + lateral + axillary. views *light bulb sign.
- ~~Managment~~ light bulbsign
  - Present on Posterior shoulder dislocation.
- managment
  - reduction under GA
- Complication
  Ⓐ unreduced dislocation
  Ⓑ recurrent dislocation

Light Bulb sign

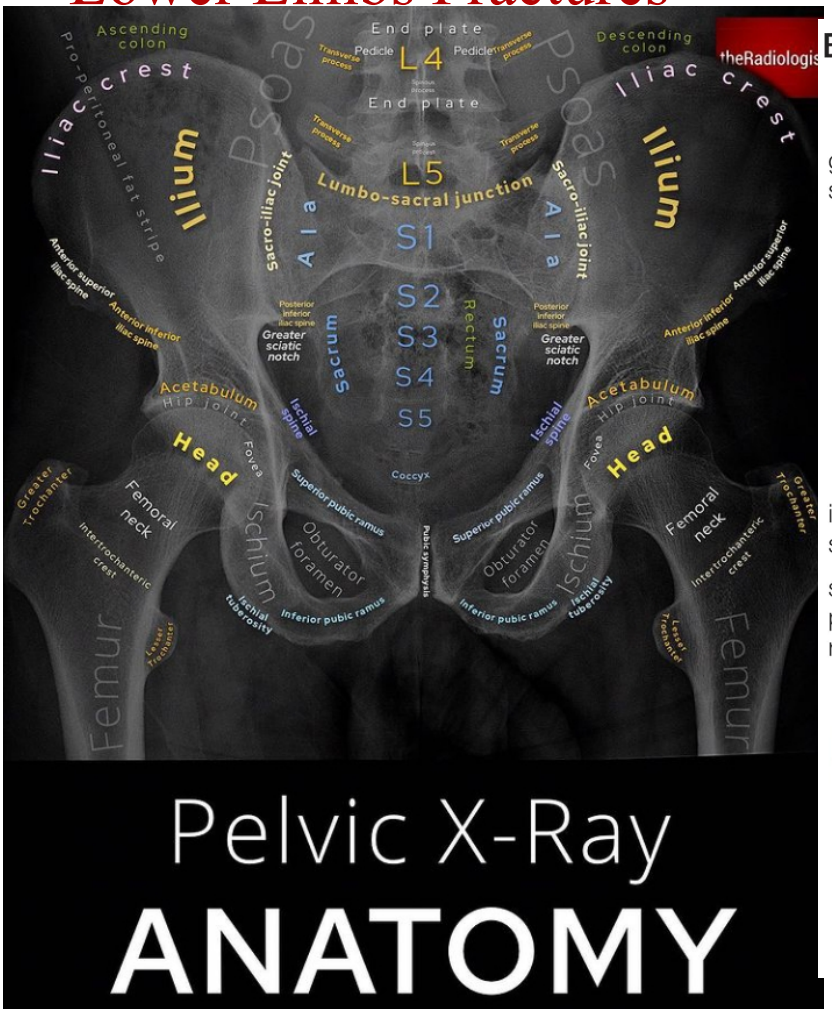
Posterior Dislocation

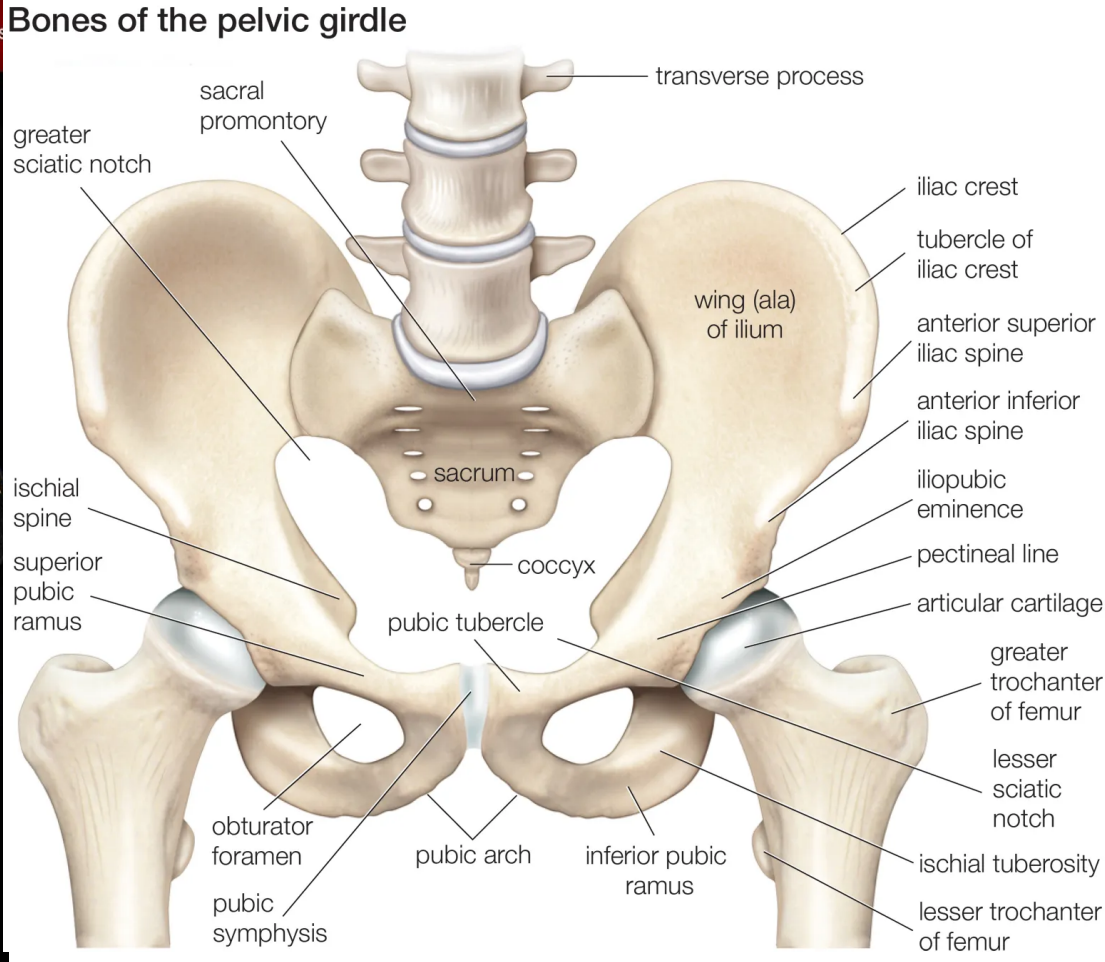


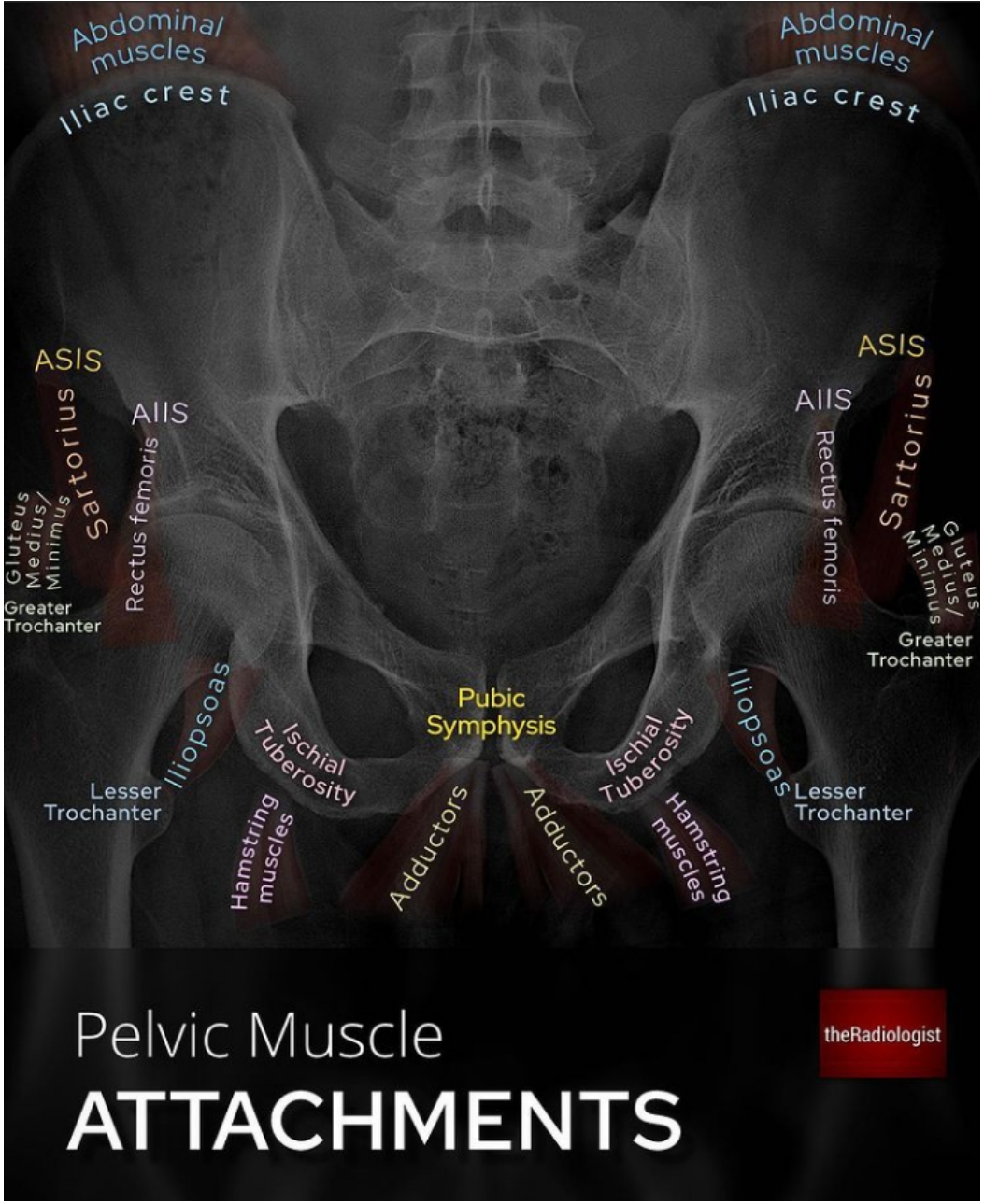
LOWER LIMB FRACTURES

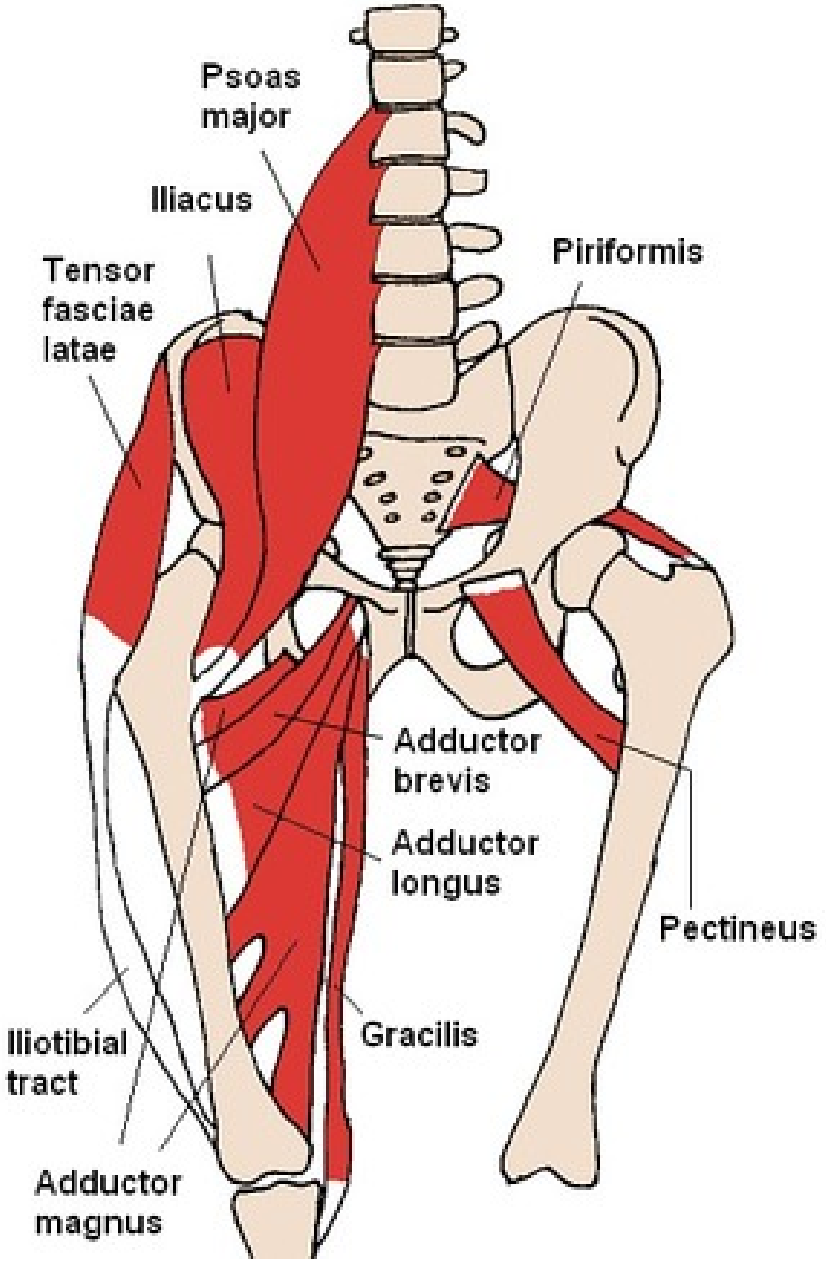
edited by : Mohammad E. Qarmash
. Marah M Olimat

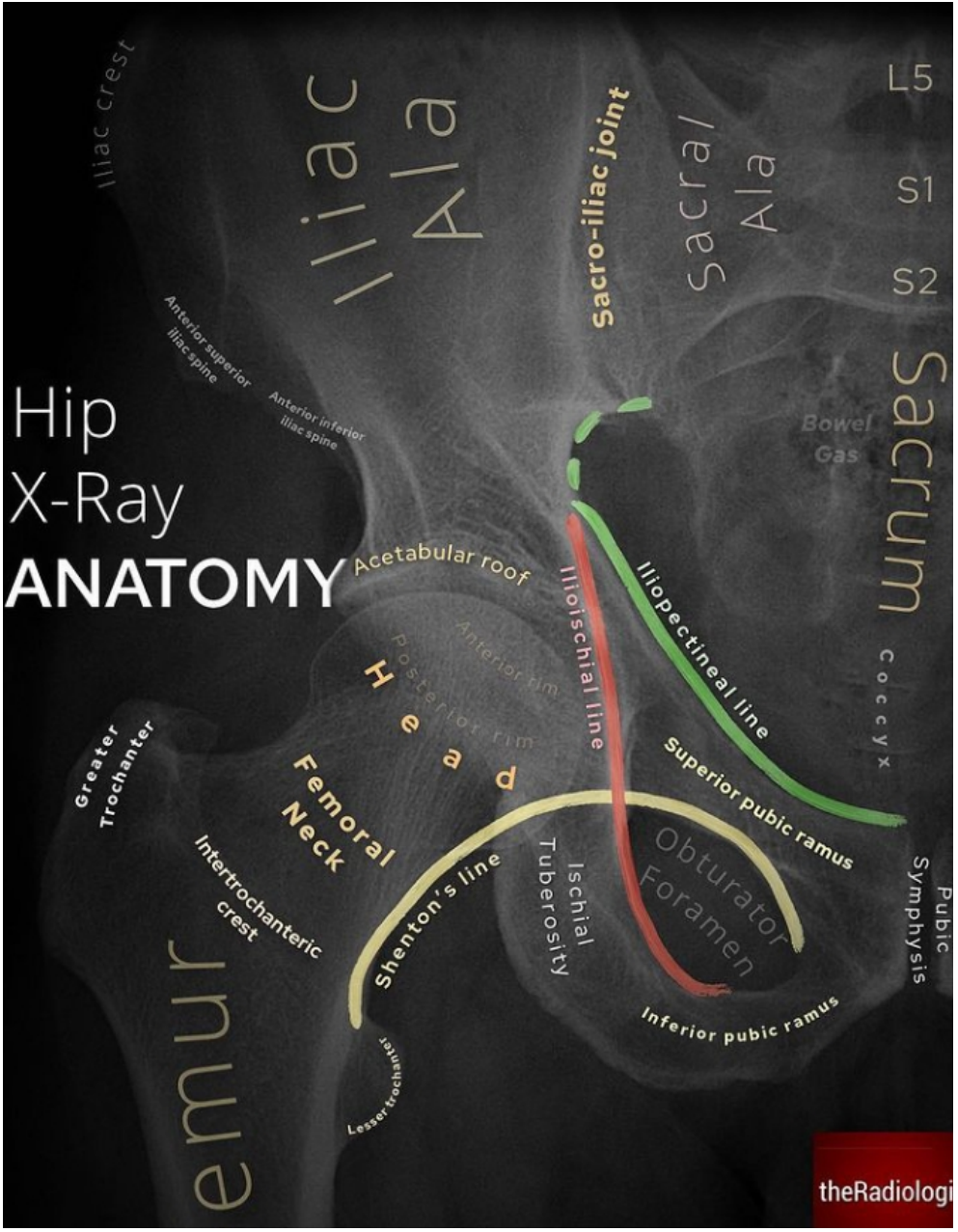
Lower Limbs Fractures



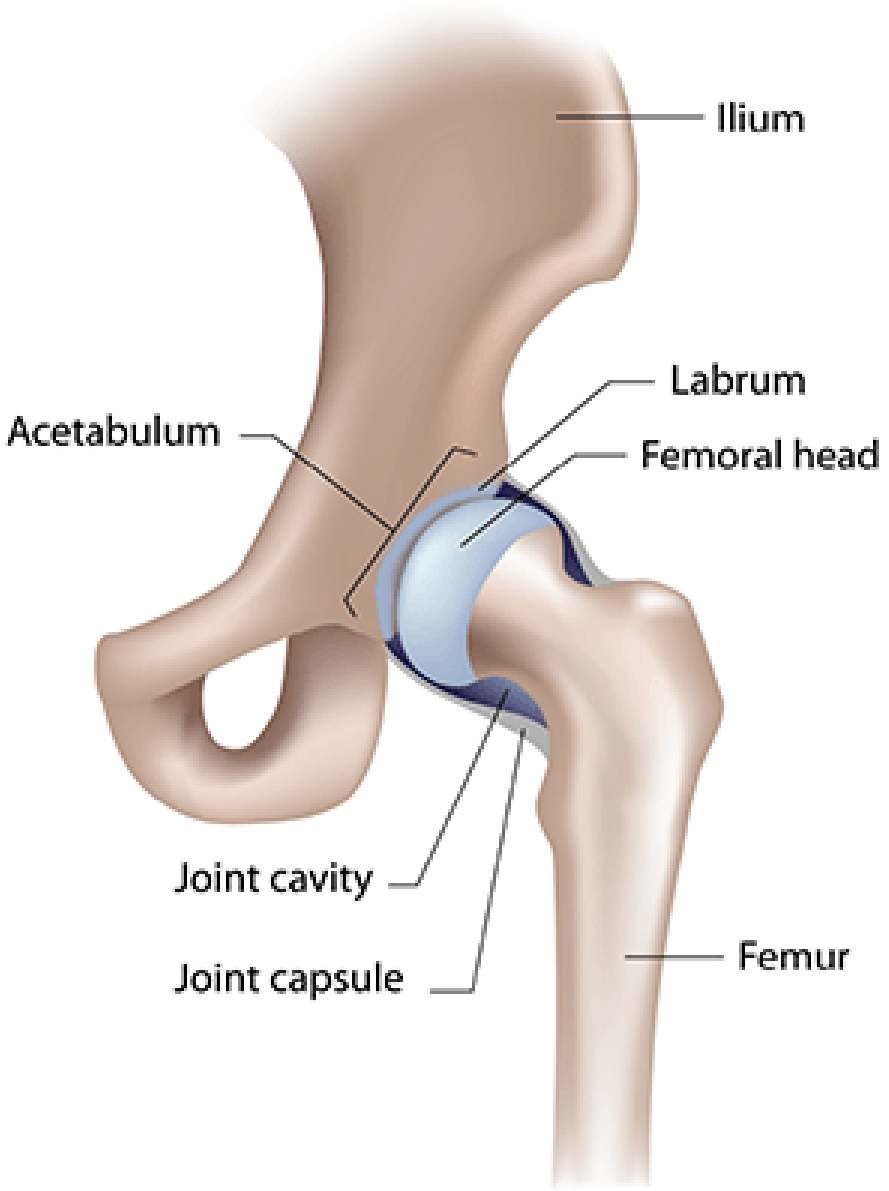


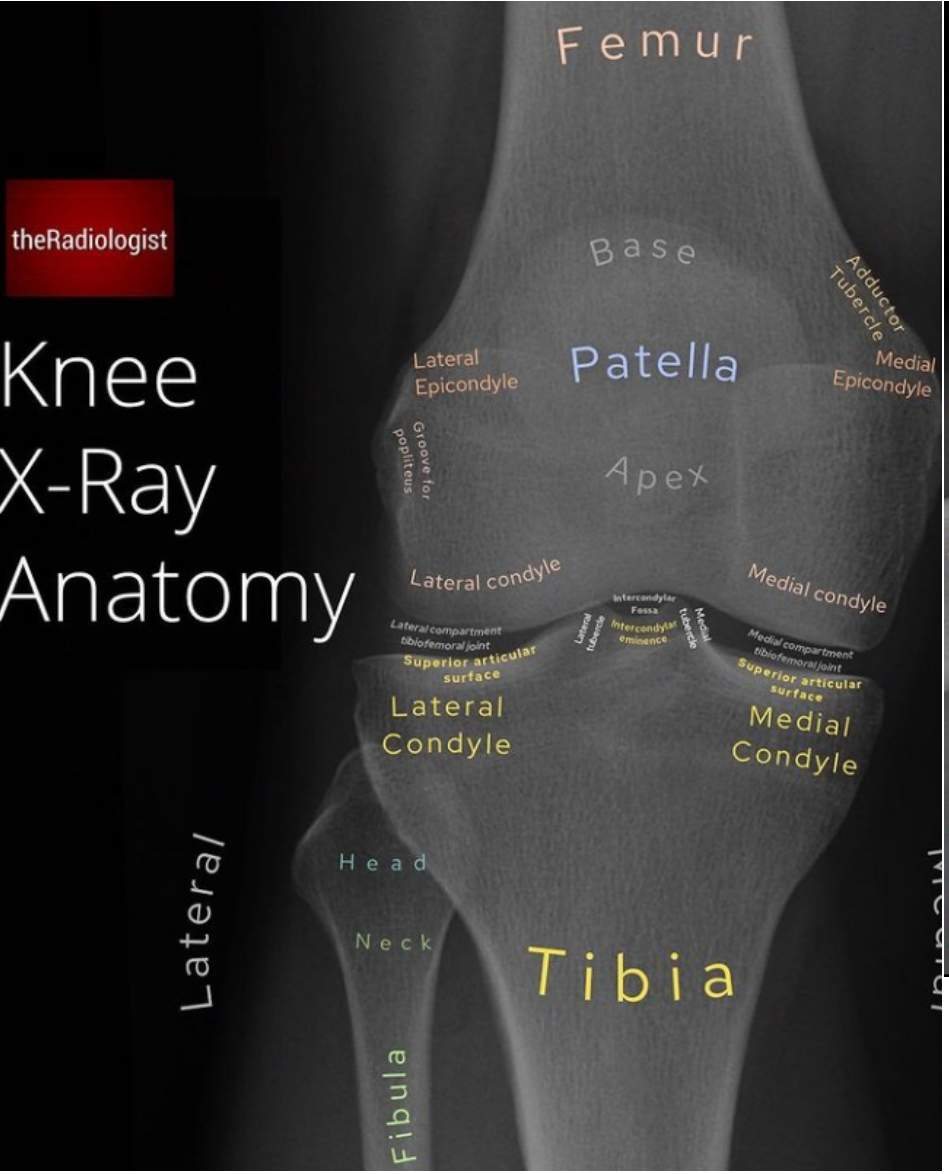

Abdominal muscles
Iliac crest
Abdominal muscles
Iliac crest
ASIS
AIIS
Sartorius
Rectus femoris
Gluteus Medius/ Minimus
Greater Trochanter
ASIS
AIIS
Rectus femoris
Sartorius
Gluteus Medius/ Minimus
Greater Trochanter
Pubic Symphysis
Iliopsoas
Ischial Tuberosity
Lesser Trochanter
Hamstring muscles
Adductors
Adductors
Ischial Tuberosity
Iliopsoas
Lesser Trochanter
Hamstring muscles
Pelvic Muscle
ATTACHMENTS
theRadiologist

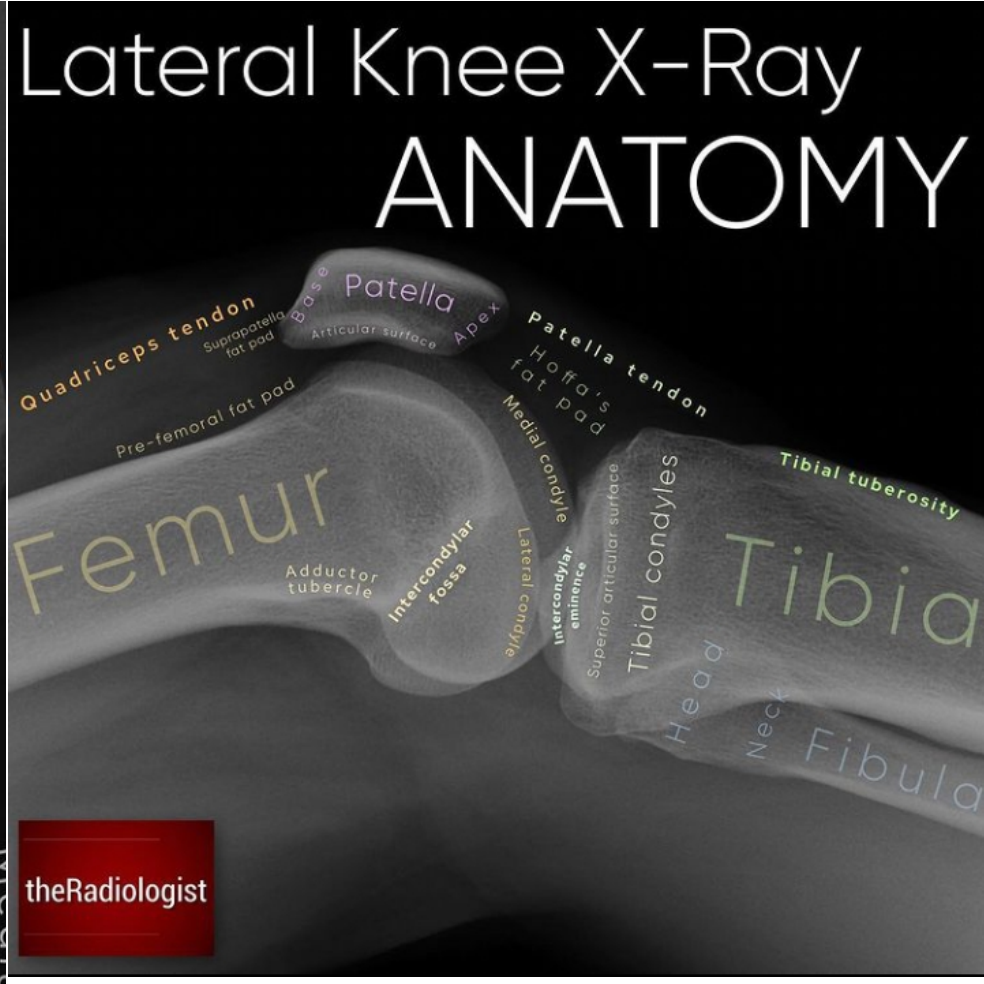

Psoas major
Iliacus
Tensor fasciae latae
Piriformis
Adductor brevis
Adductor longus
Pectineus
Gracilis
Iliotibial tract
Adductor magnus

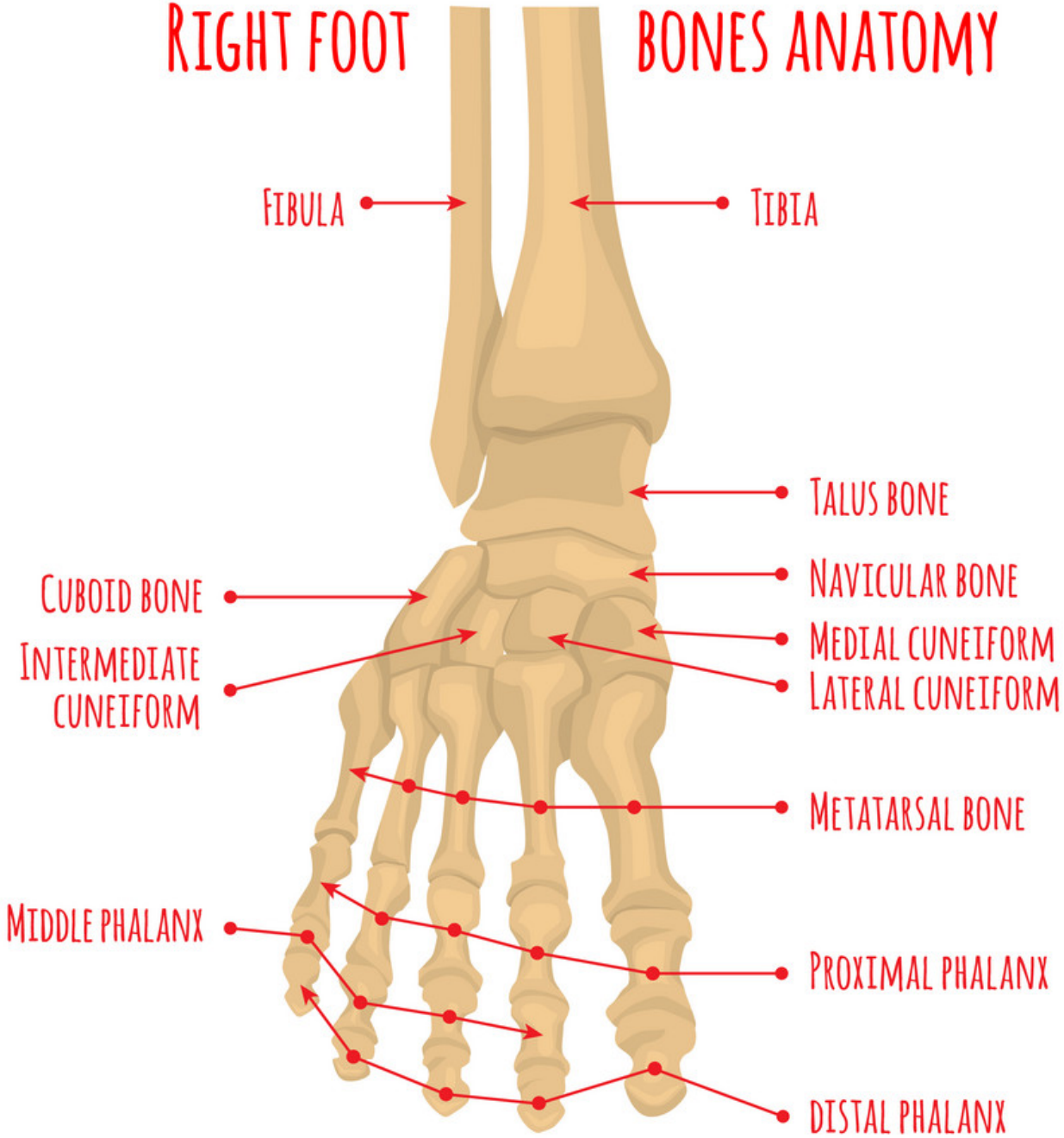


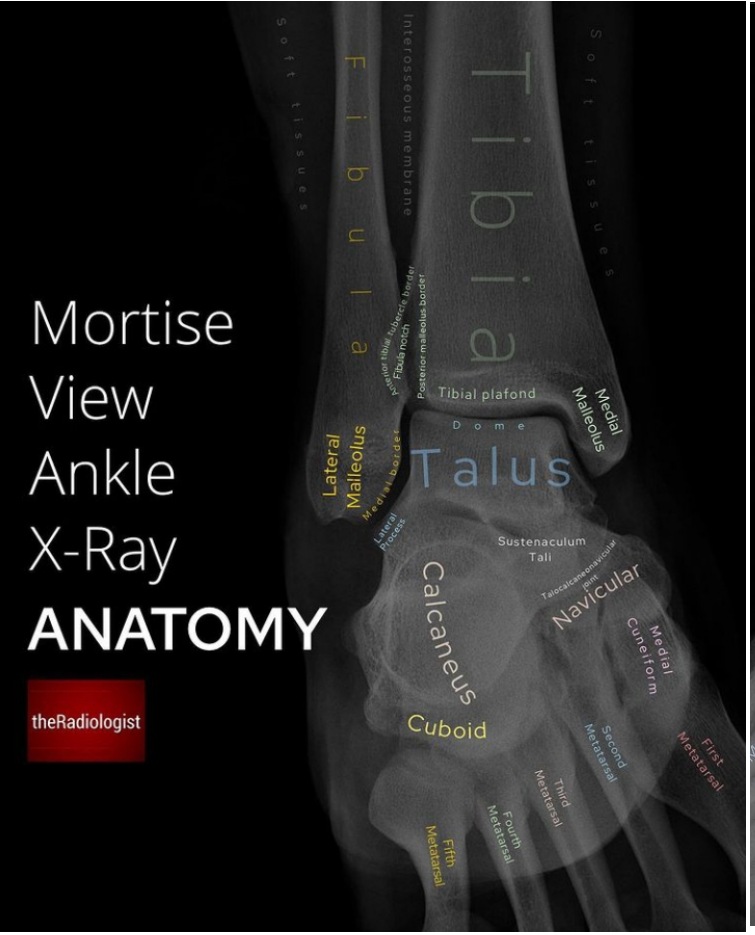
The Hip Joint

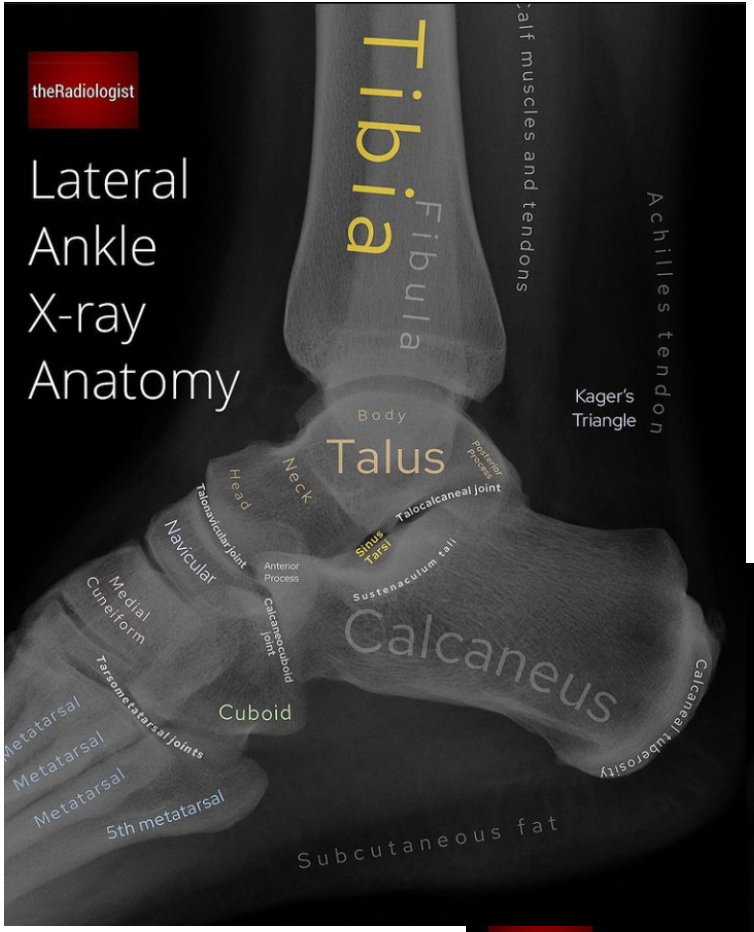


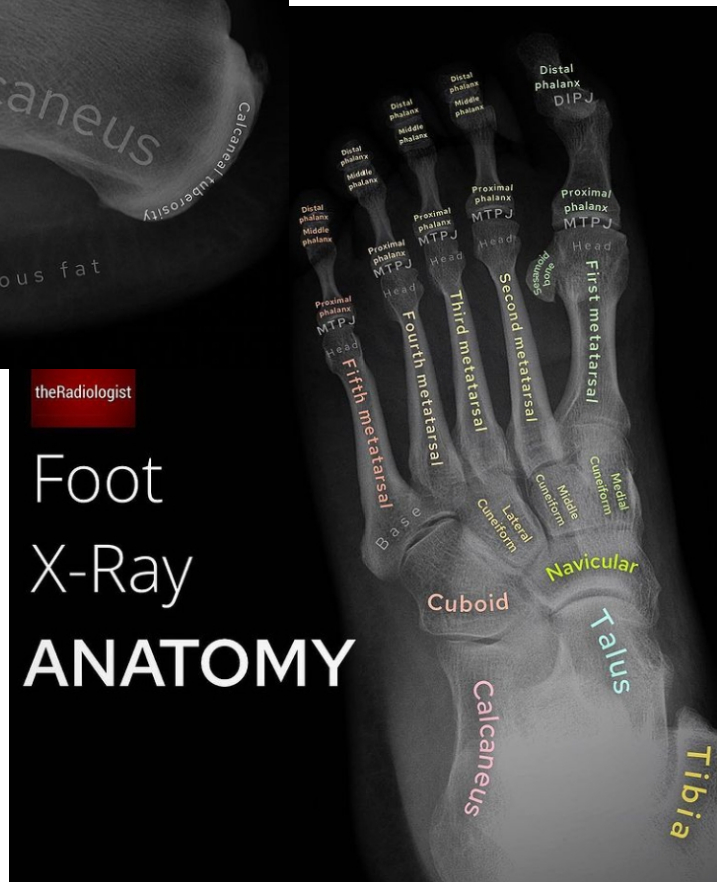

theRadiologist
Knee
X-Ray
Anatomy
Femur
Base
Adductor Tubercle
Lateral Epicondyle
Patella
Medial Epicondyle
Groove for popliteus
Apex
Lateral condyle
Medial condyle
Intercondylar Fossa
Lateral tubercle
Intercondylar eminence
Medial tubercle
Lateral compartment tibiofemoral joint
Superior articular surface
Medial compartment tibiofemoral joint
Superior articular surface
Lateral Condyle
Medial Condyle
Lateral
Head
Neck
Tibia
Fibula
Medial


Lateral Knee X-Ray
ANATOMY
Quadriceps tendon
Suprapatella fat pad
Base
Patella
Articular surface
Apex
Patella tendon
Hoffa's fat pad
Pre-femoral fat pad
Medial condyle
Femur
Adductor tubercle
Intercondylar fossa
Lateral condyle
Intercondylar eminence
Superior articular surface
Tibial condyles
Tibial tuberosity
Tibia
Head
Neck
Fibula
theRadiologist


RIGHT FOOT BONES ANATOMY
FIBULA
TIBIA
TALUS BONE
NAVICULAR BONE
CUBOID BONE
MEDIAL CUNEIFORM
INTERMEDIATE CUNEIFORM
LATERAL CUNEIFORM
METATARSAL BONE
MIDDLE PHALANX
PROXIMAL PHALANX
DISTAL PHALANX



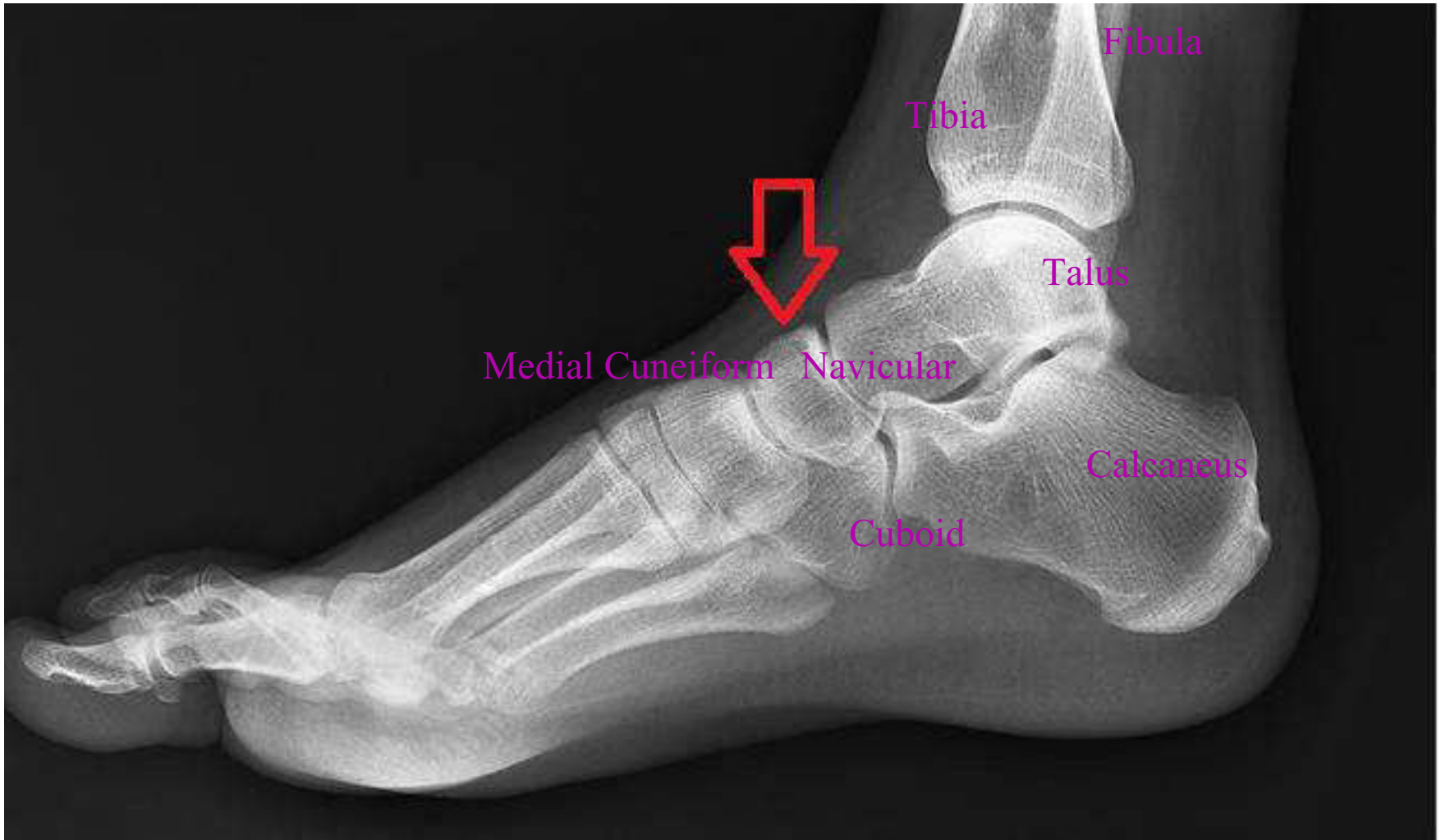




---> Memorize the bones of the foot

Name The Bone?

Navicular Bone



Subject Date No.

- pelvic Fractures

- resulted from high energy trauma, may be complicated by pelvic soft tissue damage

- it has 3 types:-

[1] isolated pelvic Fractures with intact pelvic ring

- it could be avulsion or Direct or stress

- ttt by rest & analgesia for 3 wks

[2] pelvic ring Fractures:-

- it could be stable or unstable

pt not in shock & X-ray reveals Fracture

- there are many mechanisms for injury [4] important especially for Final

(1) anteroposterior compression (usually caused by Frontal collision between pedestrian & a car)

- pubic rami or innominate bones are injurred → when injuried, called open book (external rotation)

- direction is from anterior to posterior

(2) lateral compression (usually caused by side-on impact in a road accident or falling from height

- anteriorly, the pubic rami are Fractured & posteriorly, severe sacroiliac strain + sacrum/iliac Fracture

(3) vertical shear (falling from height onto one leg)

- innominate bone on [1] side is displaced vertically (pubic rami Fracture + sacroiliac rejion) in same side

- they're severe & unstable ⟹ retroperitonial haemorrhange

(4) combined or double Fractures

- ex. pedestrian hit by a car & thrown into the air

- classified into :-

[1] type A (pelvic ring stable) [2] type B (pelvic ring rotationally unstable, vertically stable)

[3] type C (pelvic ring rotationally & vertically unstable)

NOTEBOOK

Subject Date No.

Complications of pelvic fractures:-

[1] visceral damage (2) sacral ecchymoses (3) hip dislocation

(4) open book (wide pelvis & legs are externally rotated) (5) urethral injury

(6) intraperitoneal bleeding (7) ruptured bladder.

- in examination, you'll find foot drop due to damage in L5 nerve root

- Hemorrhage in pelvic fracture [80%] from venous structures

- ttt:-

[1] pelvic compression binder applied [2] management of severe bleeding

[3] managment of urethral & bladder [4] chest/ pelvic / cervical X-ray

(5) stable fractures treated by early mobilization

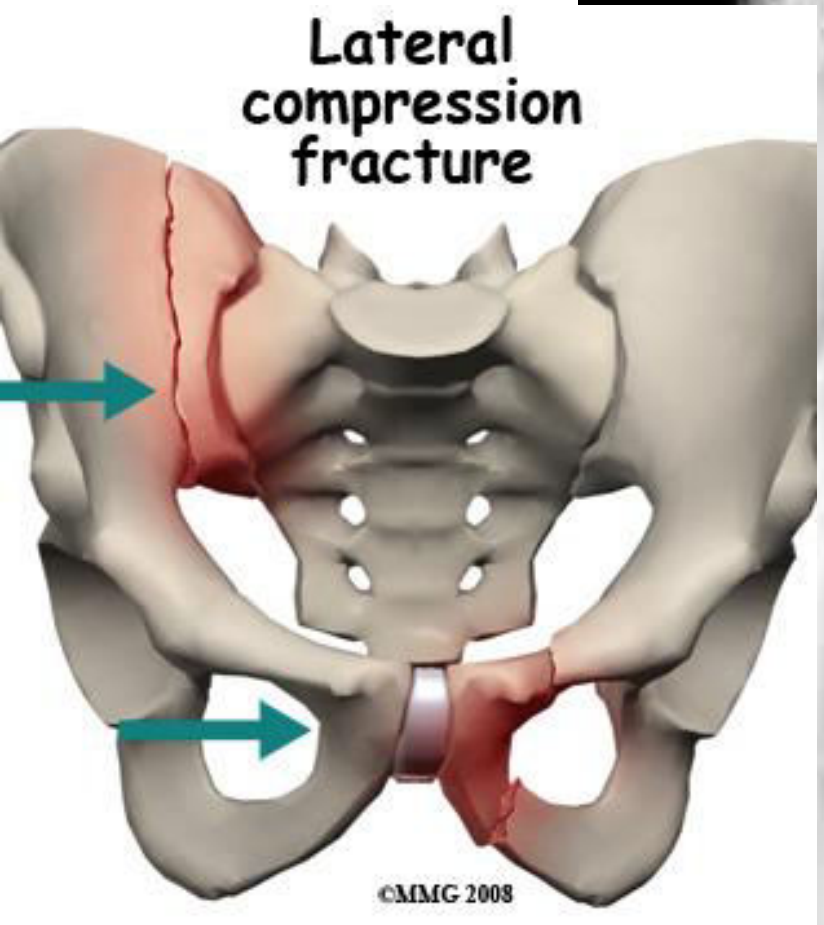
[6] undisplaced fractures → rest + analgesia for 6 wks

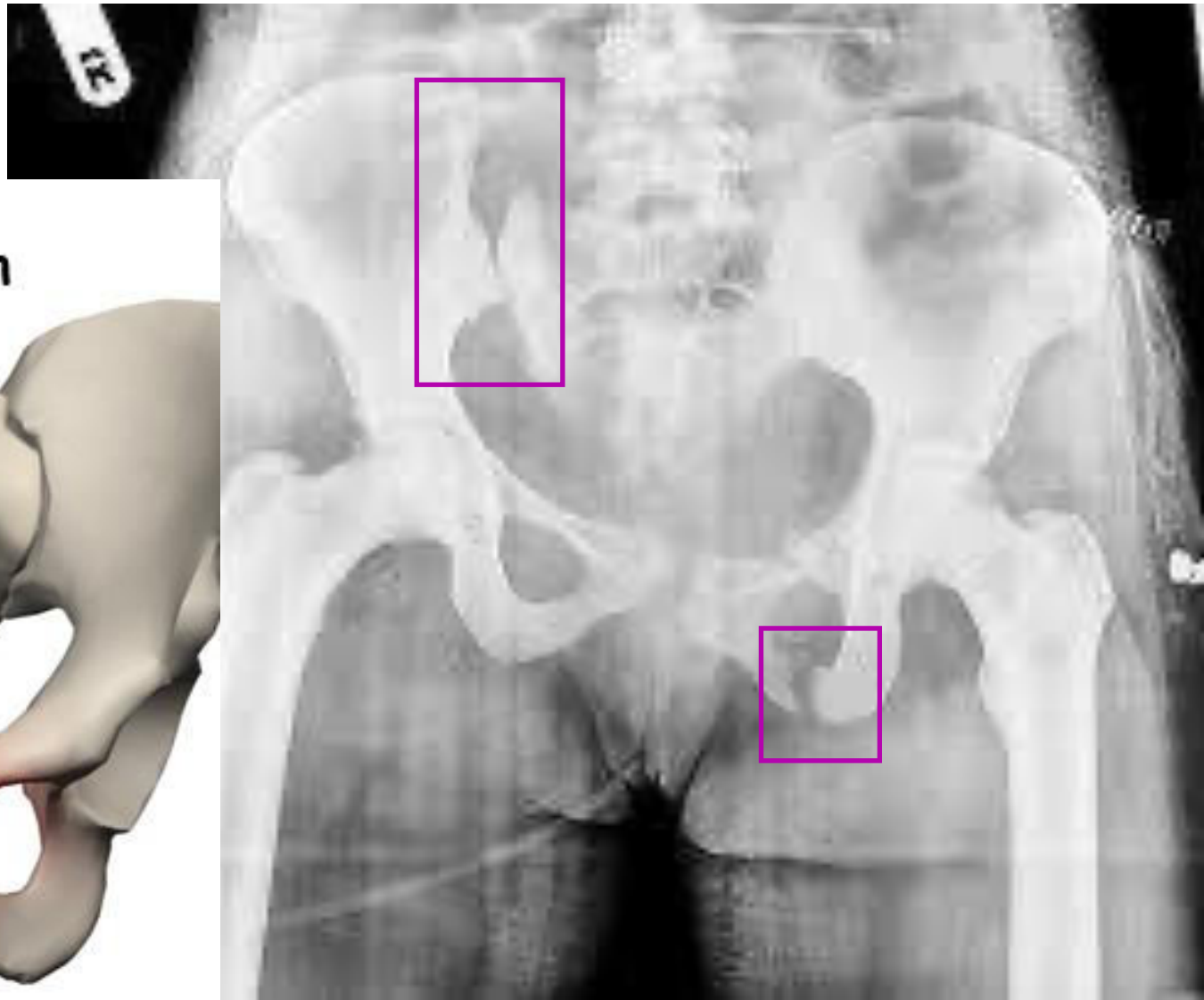
[7] APC ⇒ ant (open reduction & internal fixation) post (percutaneous placement of iliosacral screws)

(8) vertical → reduction then fixation

Lateral Compression

Pelvic Fracture Classification





Dx?

Avulsion fracture of the ischial tuborisity

Contraction of which muscle can cause this fracture?

Hamstring muscles

Dx? Avulsion IAIS Fracture

Caused by rectus femoris muscle contraction

Vertical shear associated with lateral compression

Combined Fracture

Pelvic ring

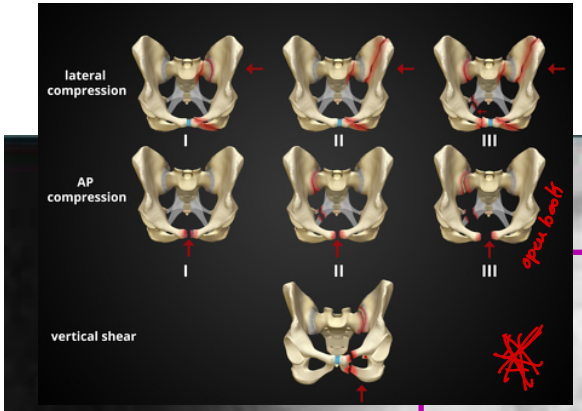
Dx?

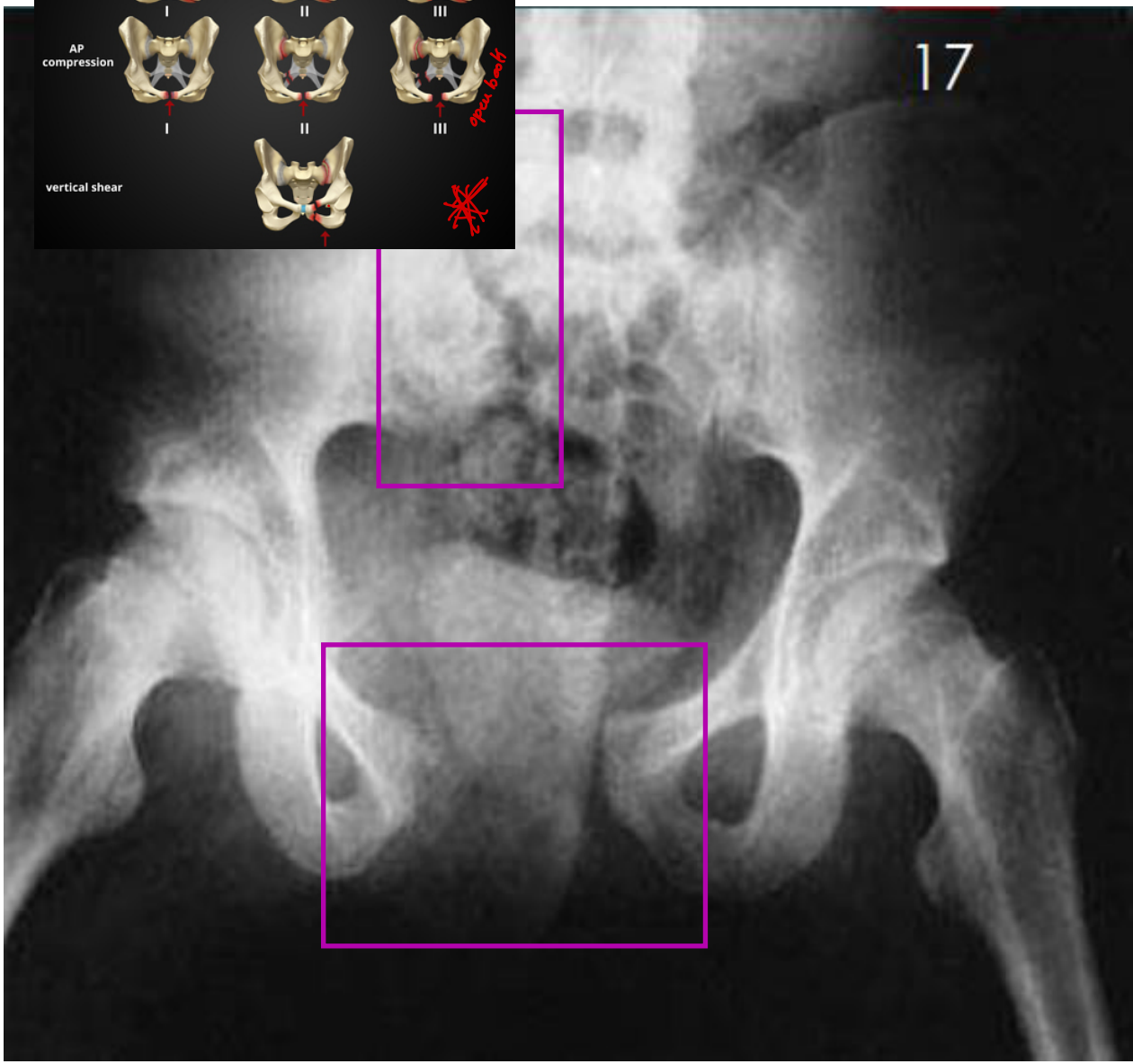
Fractures of the pelvic ring (open book injury)

what is the direction of the force causing this?

Anteroposterior compression + lateral rotation

External Rotation of the pelvis





Dx? Tiles classification type B1

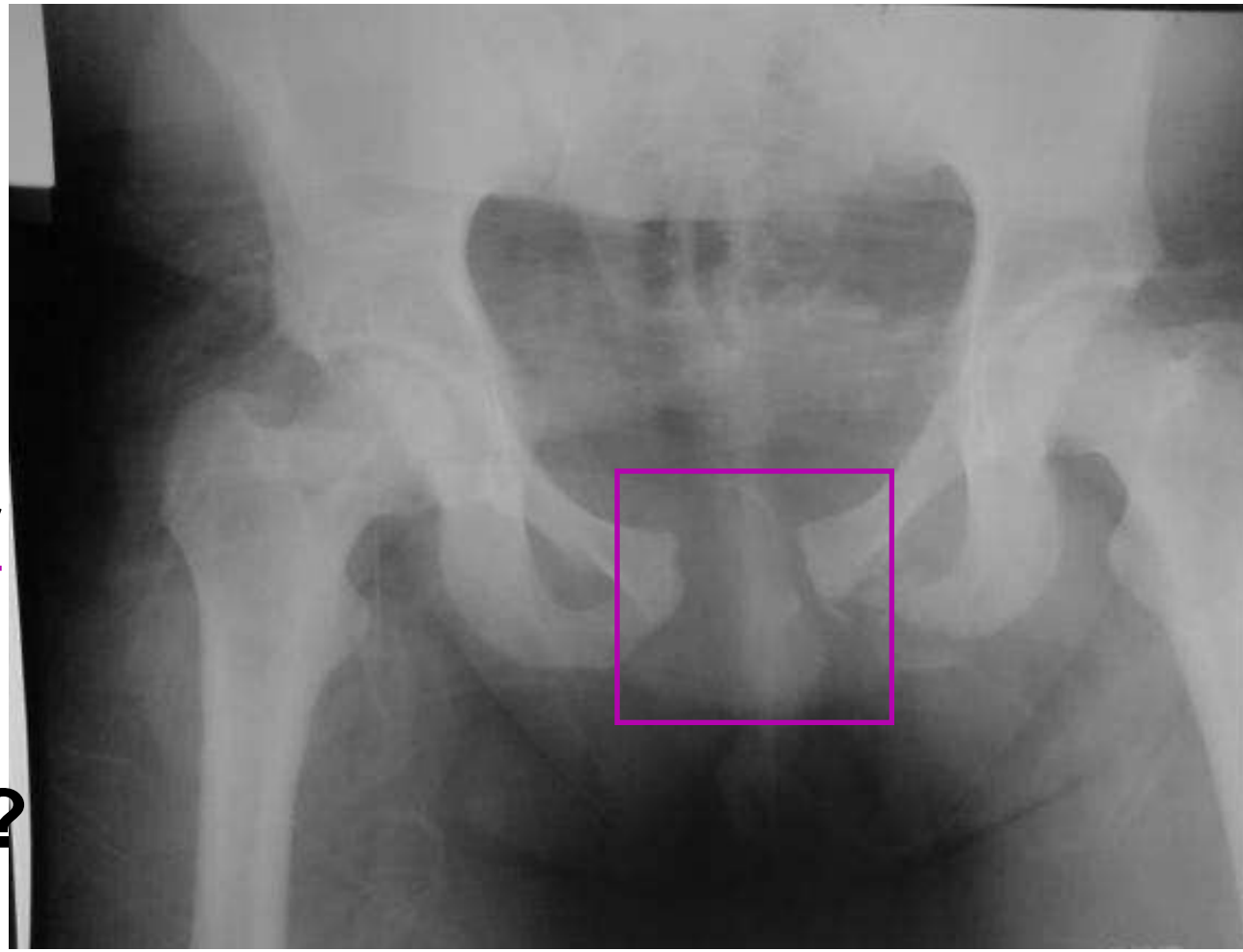
Open book Fracture

Force Direction?

Anteroposterior Compression

Complications?

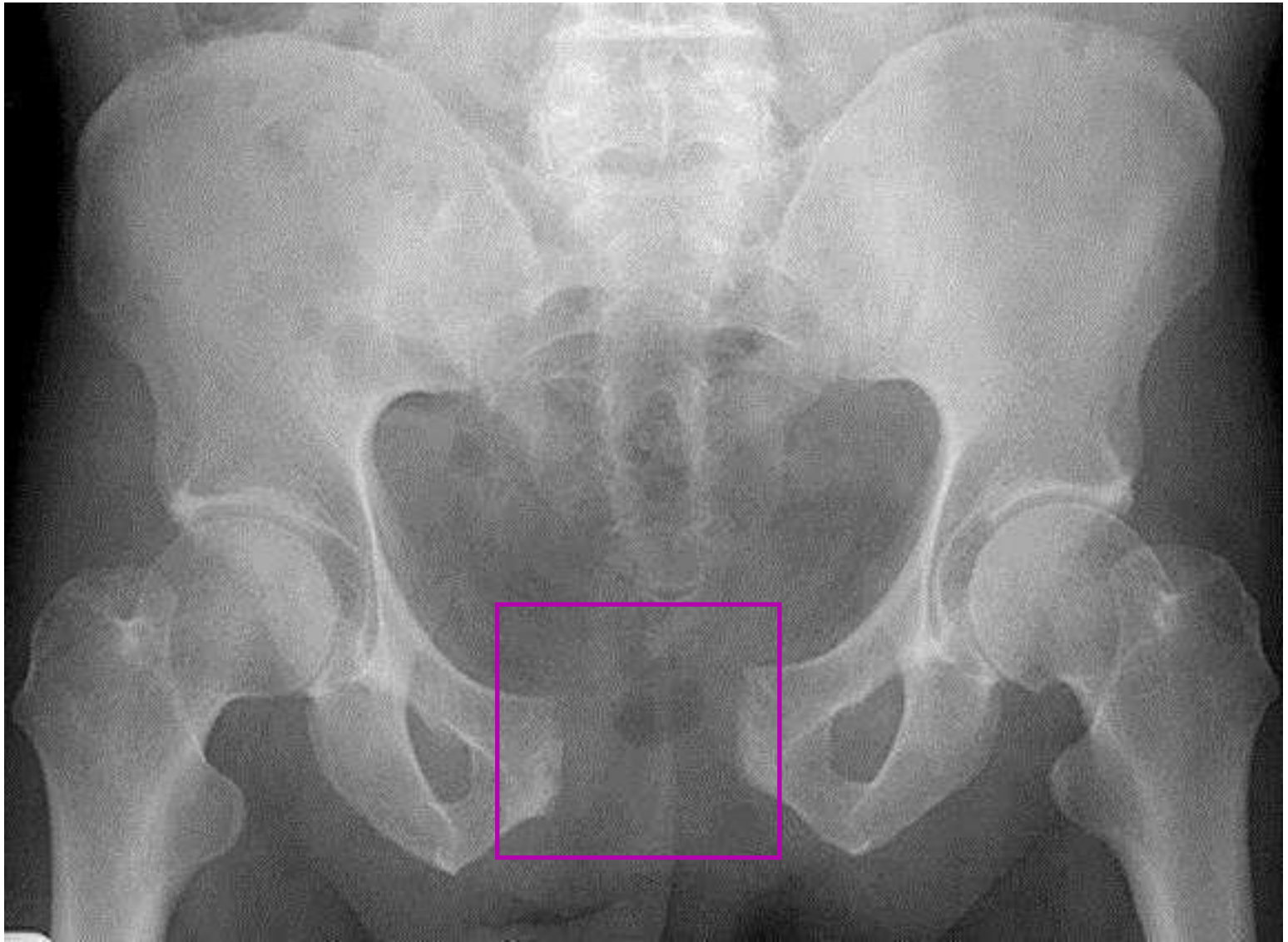
Bleeding,
Soft tissue injury



Internal bleeding (could lead to hypovolemic shock)
Visceral Injury
Malunion
Secondary osteoarthritis

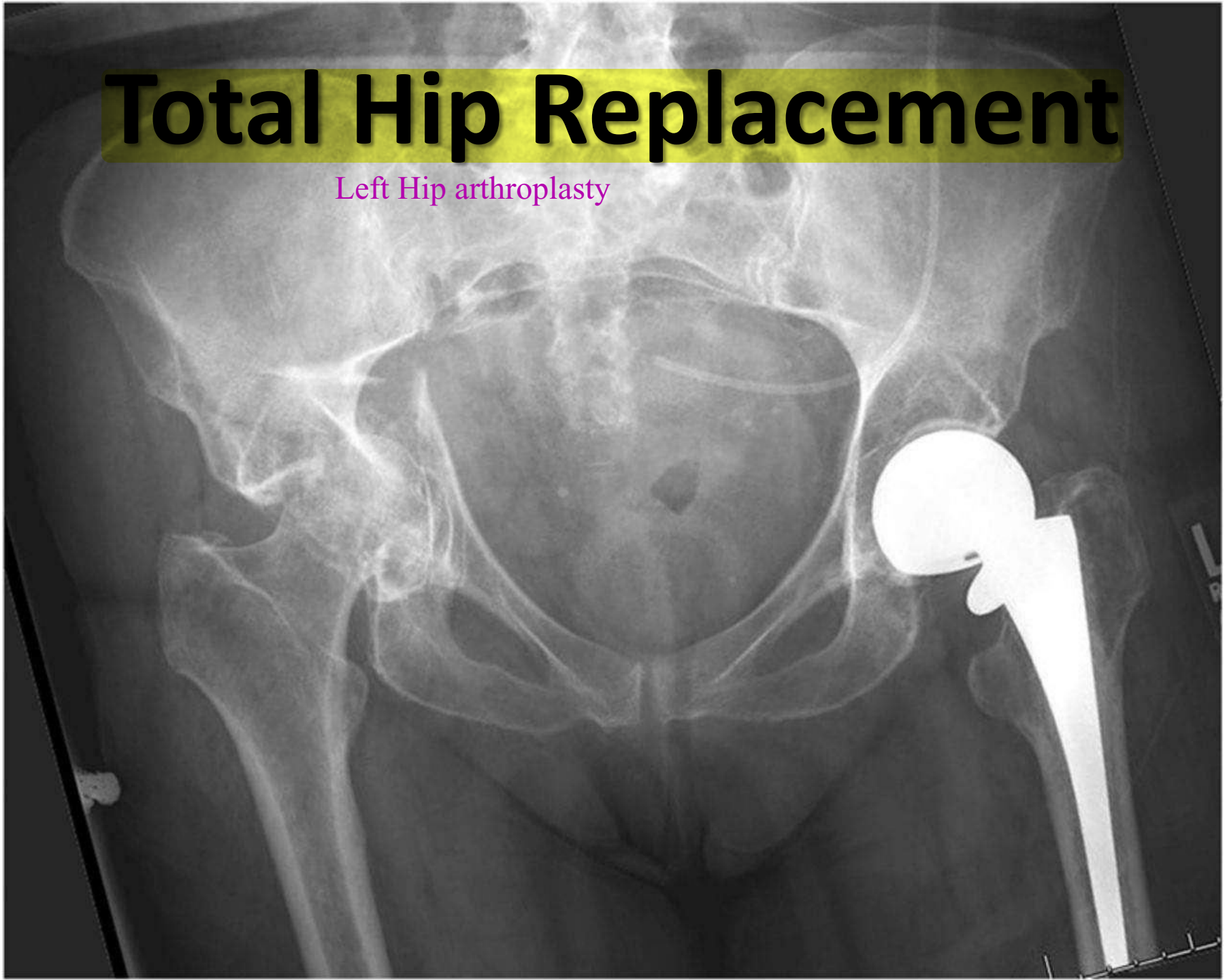
Dx? Open book fracture

What does it indicate ? AP compression



Total Hip Replacement

Left Hip arthroplasty



[2]. Fractures of acetabulum

- head of the Femur is driven into the pelvis

- Dashboard Fracture ⇒ in the posterior lip of acetabulum & associated with posterior hip dislocation

- undisplaced → conservative + minimal weight bearing + early mobilization + monitoring
  6 wks

- For unstable hips → operative TRT

Hip dislocation

(1) classified into: posterior (MC) anterior central

(2) could be simple or Fracture dislocation that involves posterior wall of acetabulum or Femoral head

(3) usually resulted From RTA

(4) Dx: leg is short + internal rotated + adducted + slightly Flexed + examine sciatica

(5) Ttt: (important)

(1) reduction (under GA) (by Flexion of the hip & knee 90° + pull the thigh vertically upwards)

(2) hip rest (by traction For 3 wks)

(3) Movement + exercises as soon as pain allow

(4) after 3 wks, pt is allowed to walk with crutches

(6) according to ant. dislocation:

(1) rare (2) leg externally rotated, abducted, slightly Flexed

(3) Ttt same to post, except while Flexed thigh pulled upward, it should be adducted

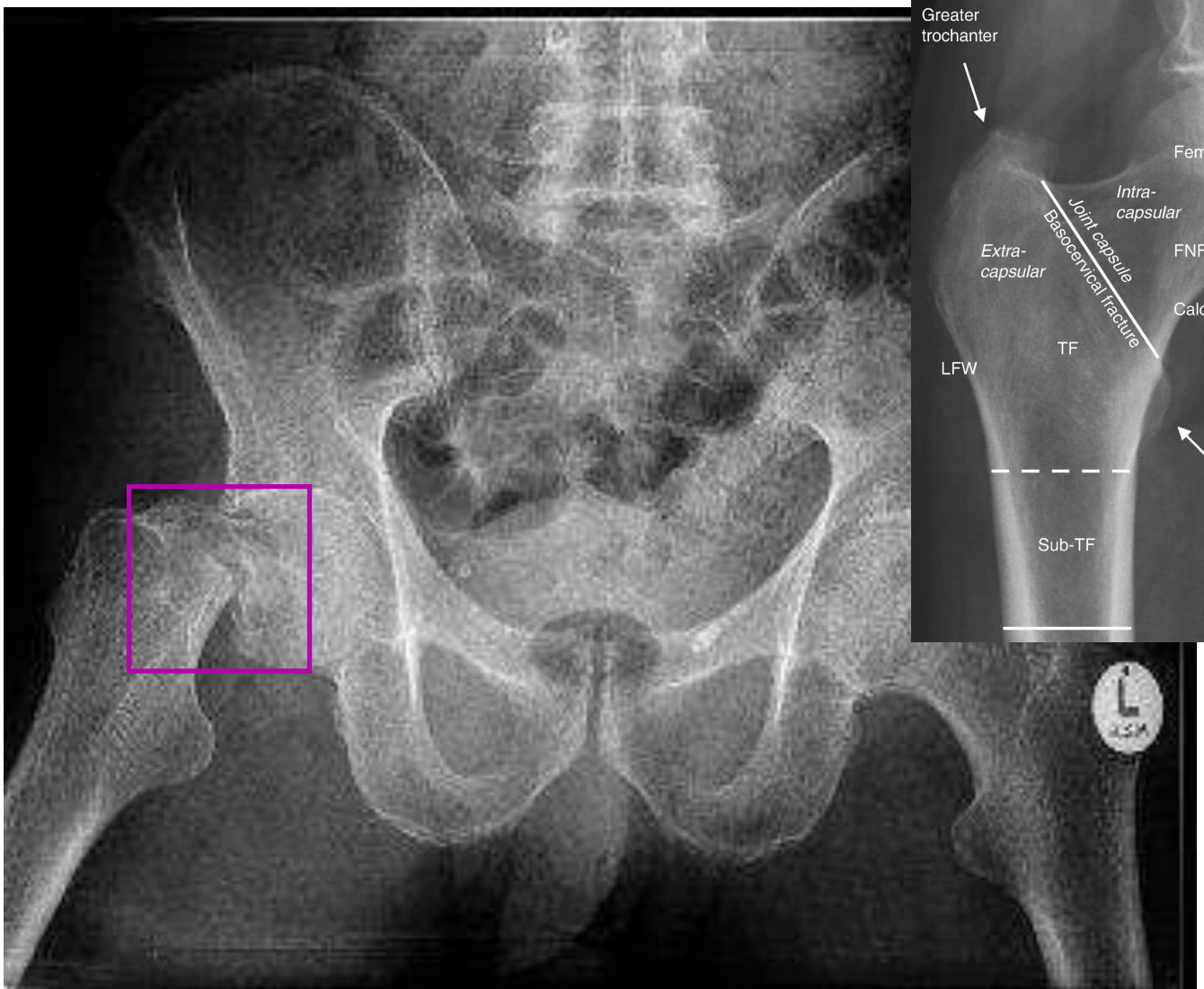
(7) according to central dislocation

(1) complex Fracture of acetabulum

Intracapsular intraarticular femoral neck fracture (Right sided) With partial displacement (Type 3 According to Garden's classification)

Dx?

Displaced Intra-capsular fracture



Subject Date No.

intertrochanteric Fractures

- common in eldrly + osteoporotic women
- unite very easily + seldom cause AVN as the Fracture occour through cancellous bone which has good Blood supply
- short external rotated limb.
- ttt by early internal Fixation → by screw & plate

Dx?

Right Femur Inter-trochanteric fracture (Type 2)

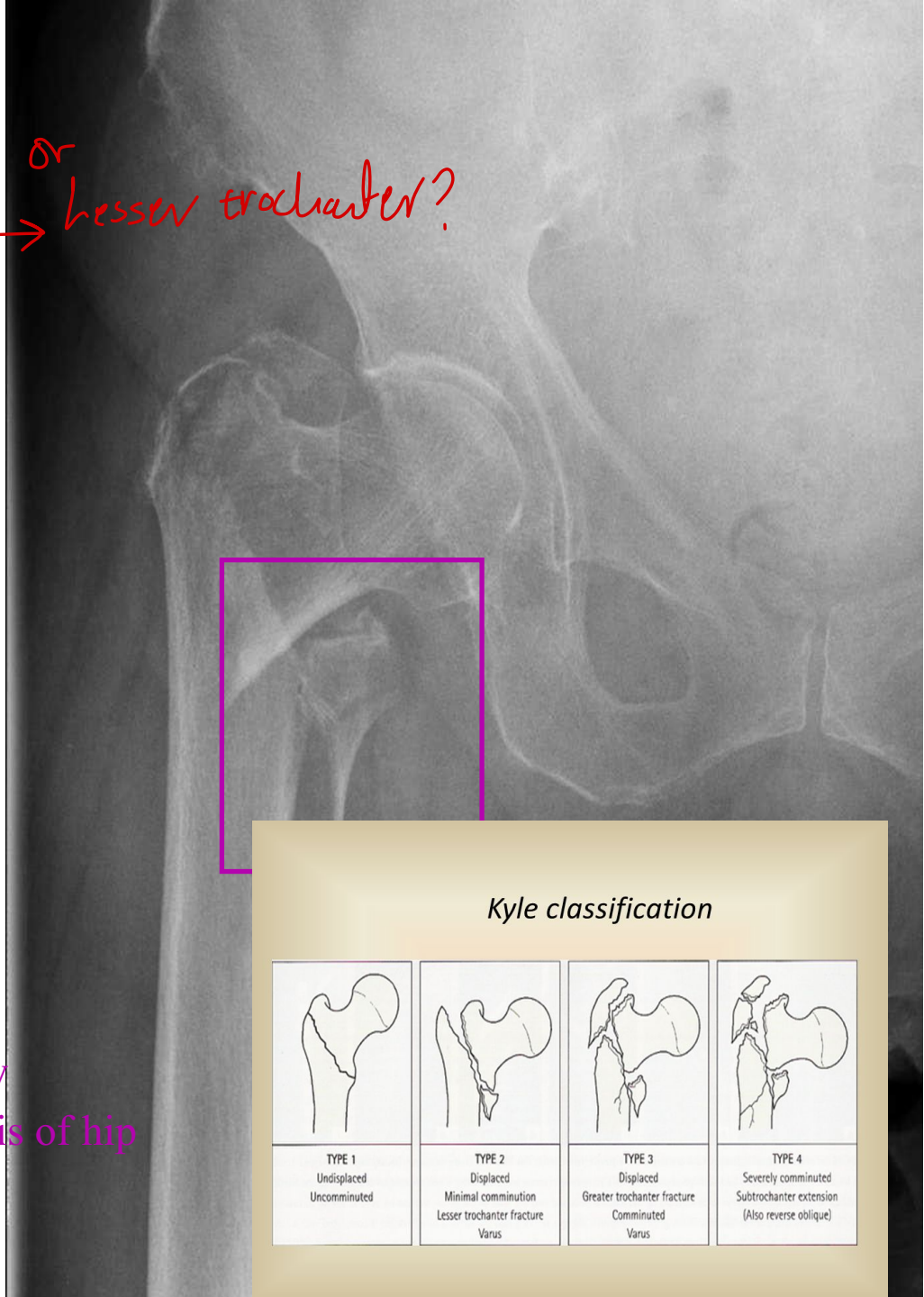
or lesser trochanter?

Displaced
slightly comminuted
Lesser trochanter fracture
Varus

Most common Complication?

Malunion,
Bleeding,
Soft tissue injury

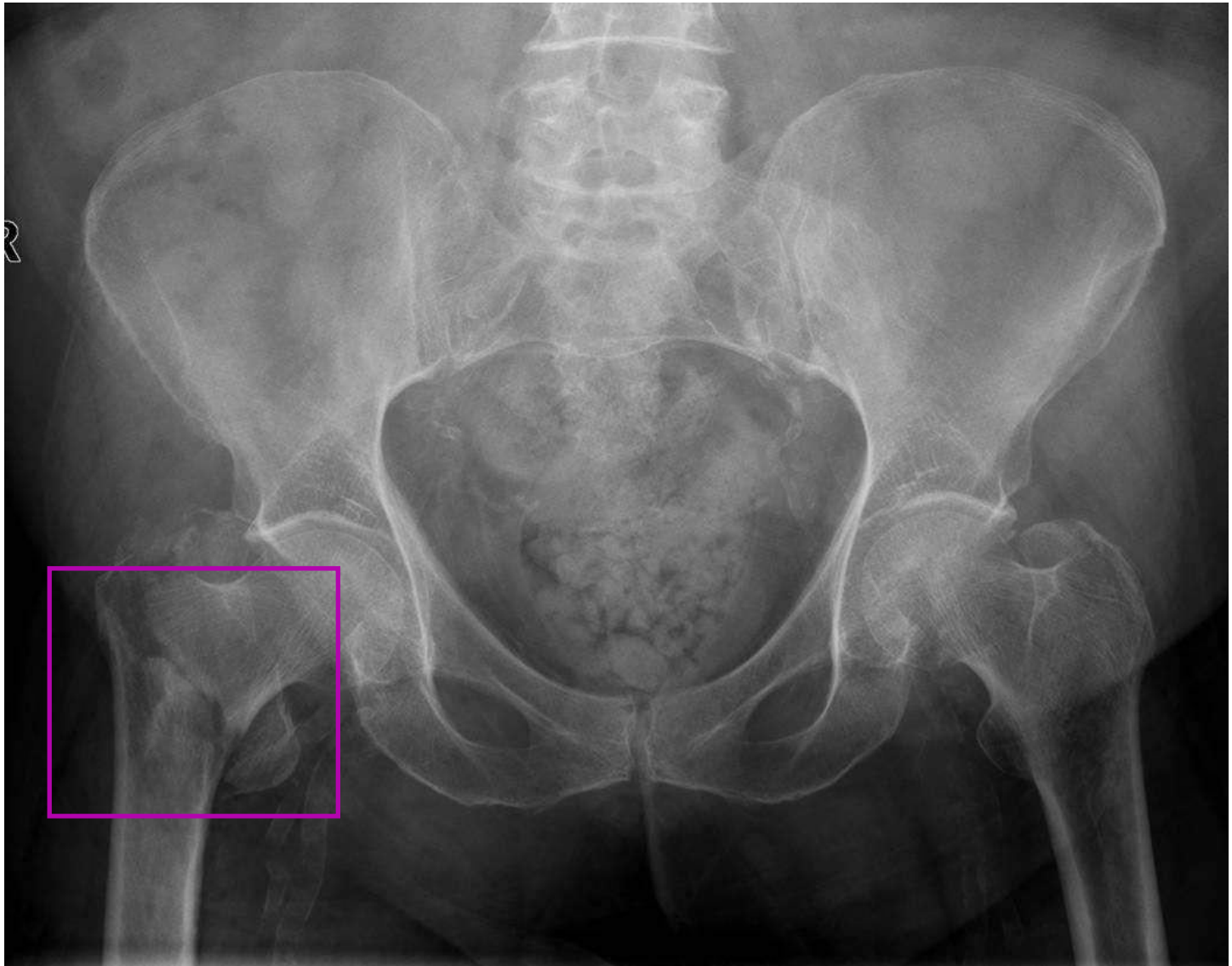
Myositis ossificans
Nerve injury
Osteoarthritis of hip



Dx? Right inter-trochanteric fracture

Type 3 According to Kyle's Classification

Most common complication? Malunion, failure of fixation



Dx?

Inter-trochanteric fracture

Most common Complication?

Malunion

Femoral neck Fractures

(1) resulted From Falling directly onto the greater trochanter

(2) MC seen in elderly with **osteoprosis**

(3) lateral rotation limb with leg looks short

(4) complicated to have **non-union** & **AVN** + **OA**

(5) Ttt : accurate reduction + secure Fixation + early activity (to prevent thromboembolism)

by screws or sliding

Dx?

Femur neck fracture

Treatment?

ORIF

Complication?

- Non union
- AVN

Dx?

Femur neck fracture

Intraarticular intracapsular femoral neck fracture

Complication?

- Non union
- AVN

Femoral shaft Fractures

- in young ⇒ high energy trauma in eldrly ⇒ pathological children → abuse
- most of them are comminuted & sometimes there's segmental Fracture
- managed by traction + thomas splint immobilisation before shifting the pt
- complicated by vascular injury, infection, malunion

Name the site and the pattern of this fracture:

Left femoral shaft fracture Segmental or Segmental comminuted

(comminuted alone is wrong)

What is the name of this fracture?

femoral shaft fracture

What structure is commonly injured with this fracture?

femoral artery

Intramedullary nail (closed reduction internal fixation)
Fracture femur shaft

Spiral tibial fracture with lateral translation

Patellar fracture affecting the extension mechanism treated by open reduction internal fixation or excision with patellar tendon development "

Distal Fracture of femur

- high energy truma in young - osteoporosis in eldrly - ~~velo~~ violence in children
- the knee is swollen & deformed + tibial pulse should be palpated
- it's above Femur condyles + it's transverse & comminuted
- ttt by traction through the proximal tibia + the limb is cradled on a thomas splint with a knee Flextion piece + encourge movements

- if reduction (close) Fails ⇒ open reduction + internal Fixation
- locked intramedullary nails are also used

Dx? Supracondylar femur fracture

Displacement? Translation, Angulation

What vessel at risk? Popliteal artery

Describe the displacement?

Lateral translation and shortening

and medial Angulation

Q Angle

- Assessment of
  - Lower extremity alignment
  - Patella position
- Most efficient angle for quadriceps to function is ~10º
  - Males: 10-14º
  - Females: 15-17º
- Genu valgum (knock kneed)
  - > 17º = excessive
- Genu varus (bowlegged)
  - Negative
- ↑ Q angle => ↑ stress on MCL

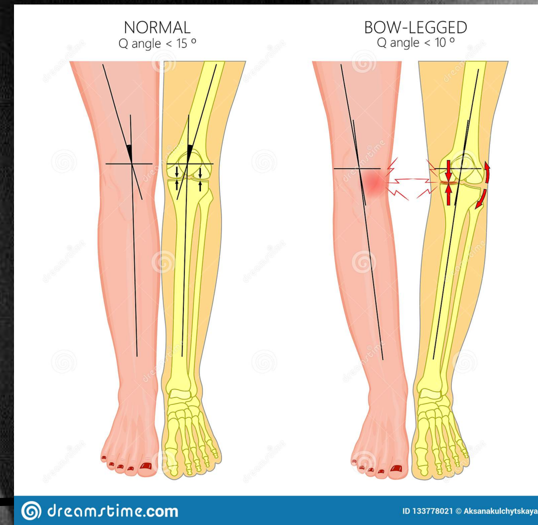
Dx?

malunion

---> Normal Angle (<15)

---> Genu Varus (<10)

---> Genu Valgus (> 15)



patella Fracture

[1] 3 types are:-

(1) direct blow causing undisplaced Fracture

(2) Fall or direct blow in Front of knee causing comminuted Fracture

(3) indirect traction injury causing transverse Fracture

[2] sometimes gap can be Felt + you should check if pt can actively extend the knee because this affect management

if the pt can lift the straight leg ⇒ quadriceps is intact

[3] ttt:-

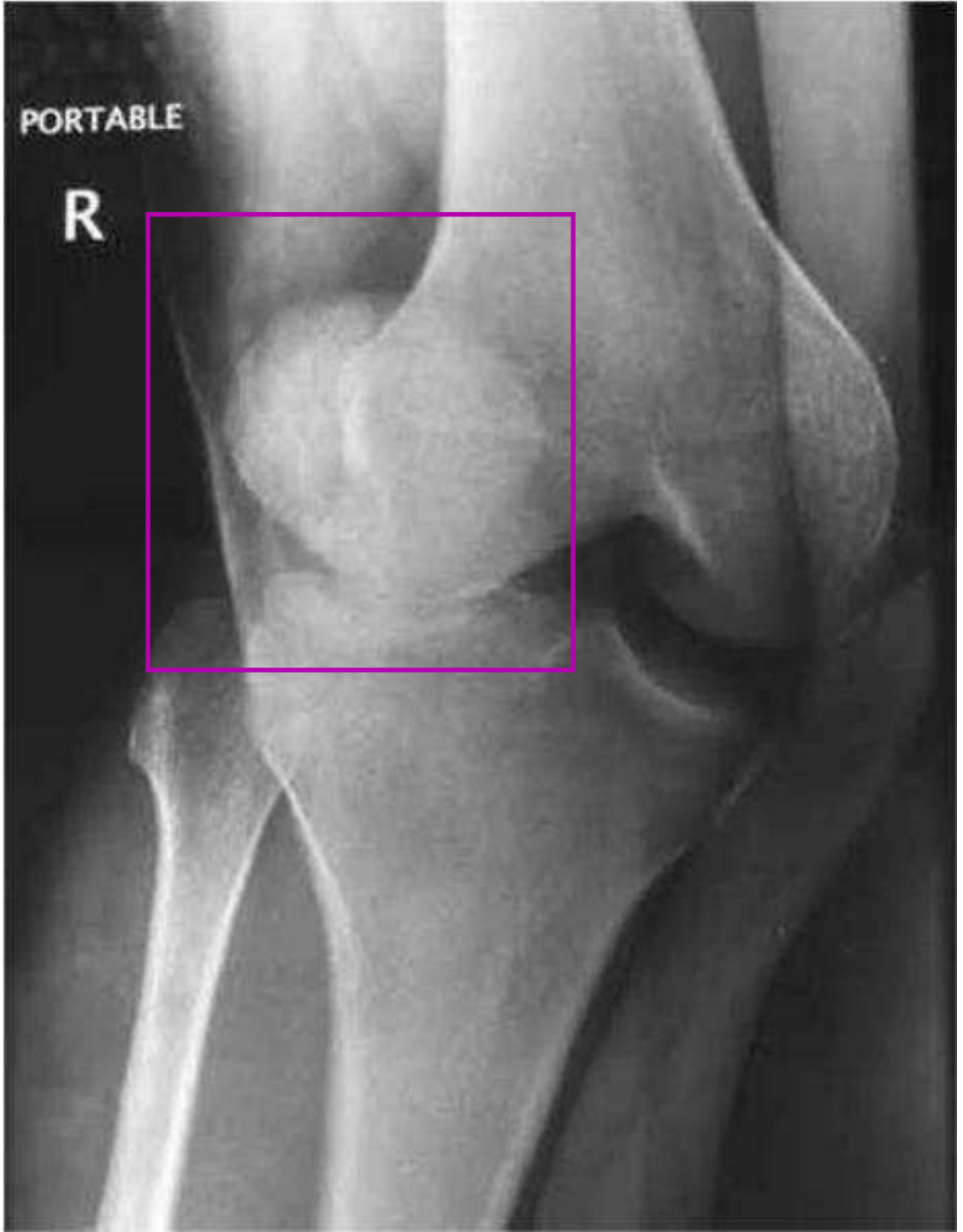
- undisplaced or minimally displaced + intact extensor mechanism → plaster cylinder holding the knee (4-6) wks + Quadriceps exercises
- comminuted Fracture + intact extensor → partial patellectomy + back slap + hinged brace
- displaced transverse Fracture → operation (internal Fixation & repair extensor expansions)

Flextion & extension exercise

Brace worn until active extension of the knee regained

Dx?

Lateral patellar dislocation



tibial plateau Fractures

[1] caused by strong bending force combined with axial load

[2] classified according to schatzker's

type 1 → lateral split → young people → undisplaced or condyler Fragment pushed inferiorly

type 2 → split with depression → wided joint + lateral displaced Fragment + should be reduced

type 3 → pure lateral depression → stable joint + split to the edge of plateau is absent

type 4 → pure medial depression → severe varus angulation causing lat collateral ligament rupture

type 5 → Bicondyler → both condyles are split

type 6 → split extends to metadiaphysis → tibial shaft is disconnected from condyles, unlike 5

[3] major vascular injury & traction injury of the peroneal or tibial N

[4] ttt :- [Function is more important than anatomical reduction]

(a) undisplaced or minimally displaced lateral condyle → conservative + haemarthrosis is aspirated
↓ compression bandage applied + knee movement

(b) with displacement → open reduction + internal Fixation

(C) For type [4] → open reduction + internal Fixation with buttress plate & screws

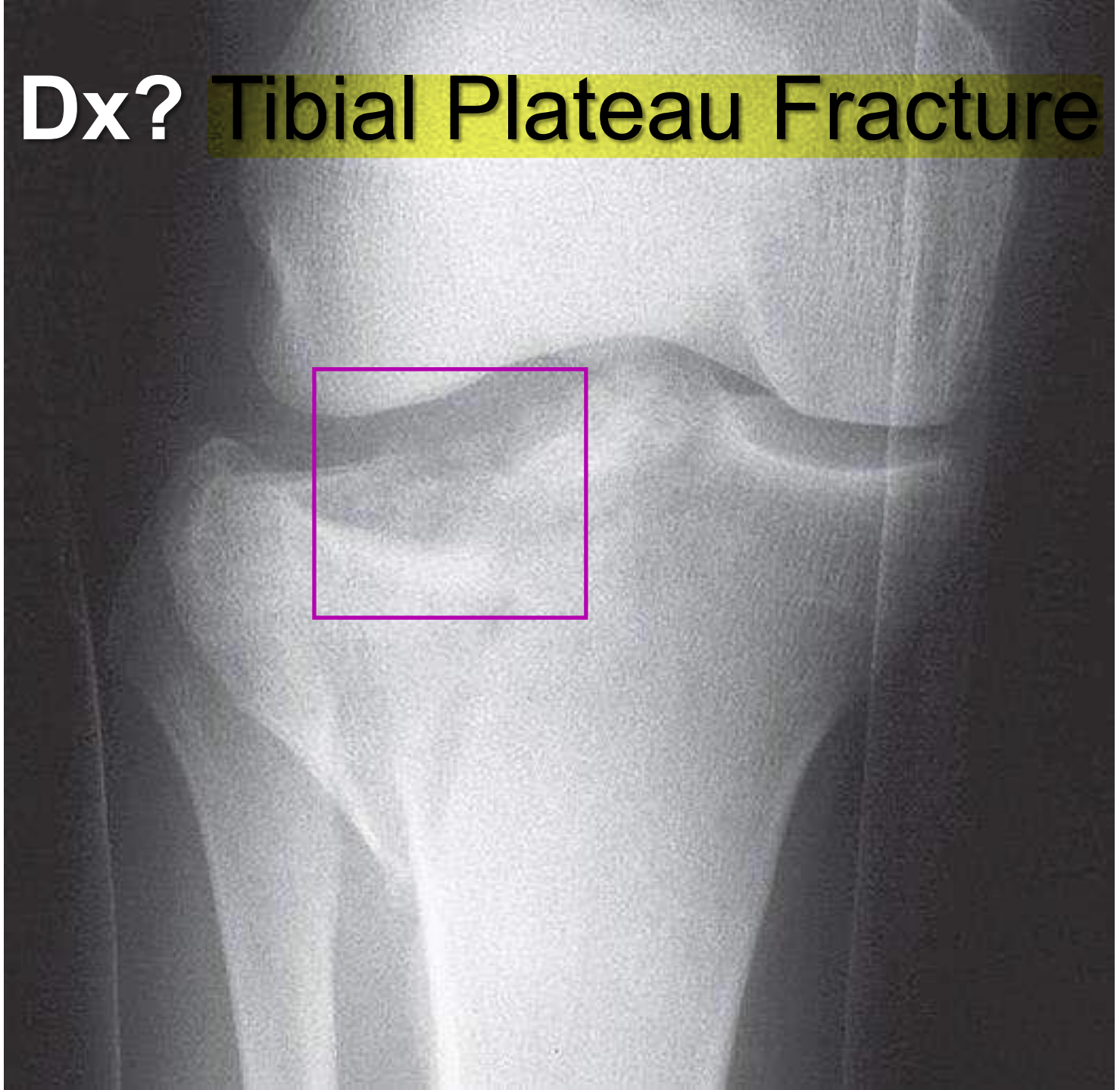
(D) markdly displaced or type 3 & 2 → same ↑ + Bone graft may be needed

(E) Bicondyler → reduced & stabilized surgically (screw Fixation + circular external Fixation)

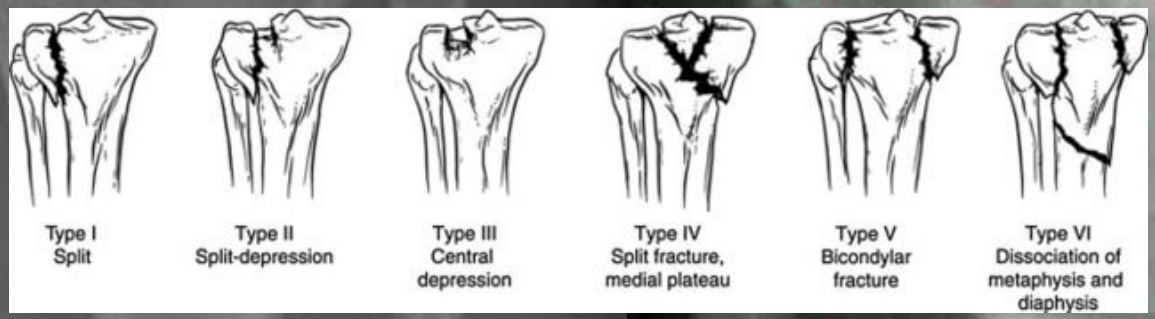
(F) osteoporotic condyler Fracture → as mentioned before but we can do total knee replacement

[5] could be complicated with compartment syndrome

Dx? Tibial Plateau Fracture



Dx? Tibial Plateau Fracture



Subject Date No.

Fractures of tibia & Fibula

[1] could be resulted From:-[1] Spiral Fracture From twisting force

[2] Angulatory Force leading to short oblique with butterFly Fract

[2] tibia is more common to be Fractured

[3] associated with compartment syndrome

[4] ttt:-

[A] undisplaced or minimally displaced ⟶ Full length cast From upper thigh to metatarsal nekk + Flexed knee & ankle at Rt angle

[B] displaced ⇒ reduction under GA + cast application

[C] high energy Fracture ⇒ external Fixation or intramedullary nailling

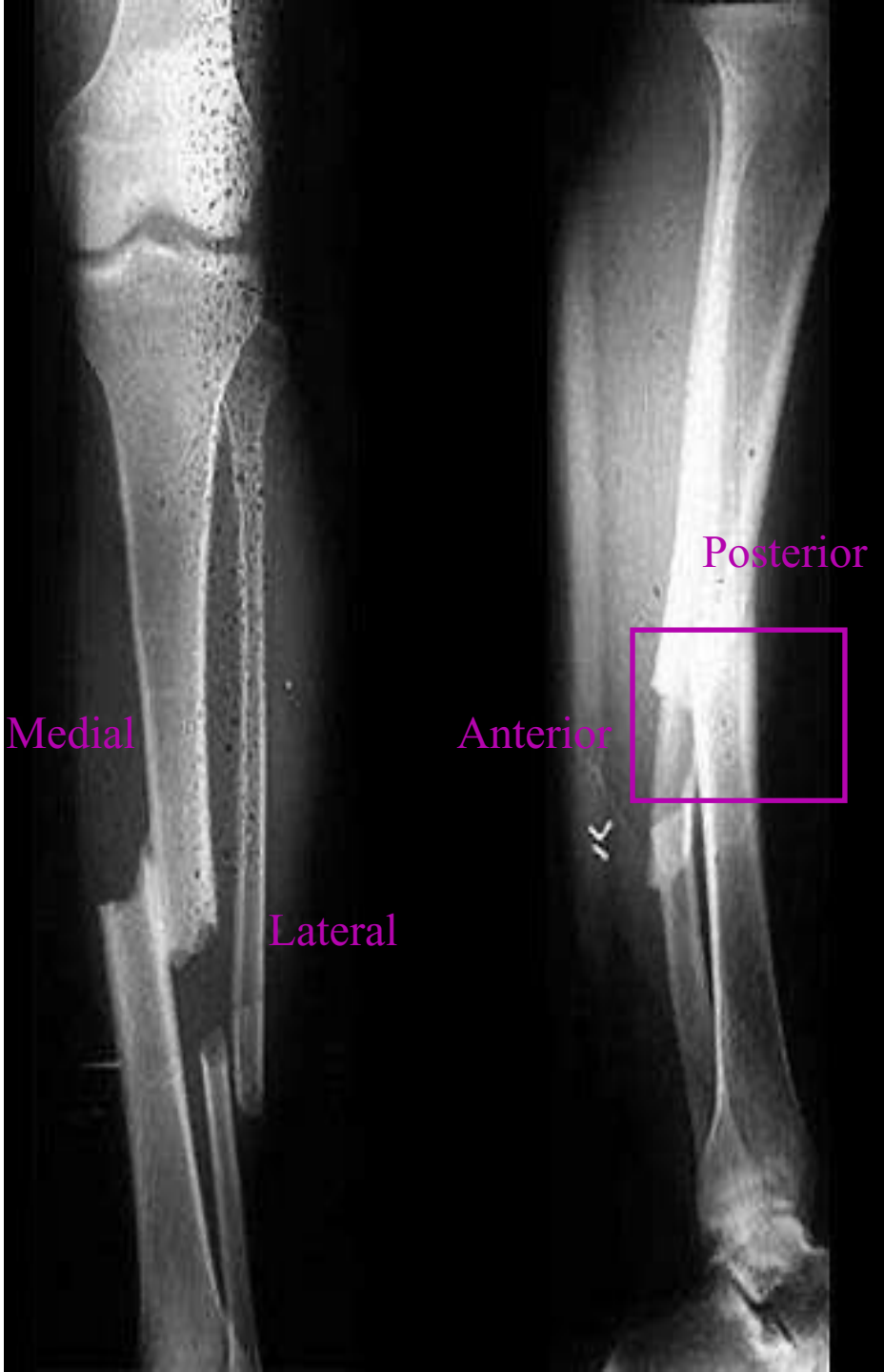
[D] open Fracture ⇒ 3A + debridement + stabilization (external) + soF tissue Cover

Dx?

Transverse fracture of the tibia and fibula

Description:

- Transverse
- Shortening
- 100% Anteromedial Translation
- Posterolateral Angulation (about 20 degree)
- No Rotation



Dx?

Comminuted mid shaft fracture of tibia with fibular fracture

Dx?

Hypertrophied nonunion fracture of the tibia

CASS

Causes?

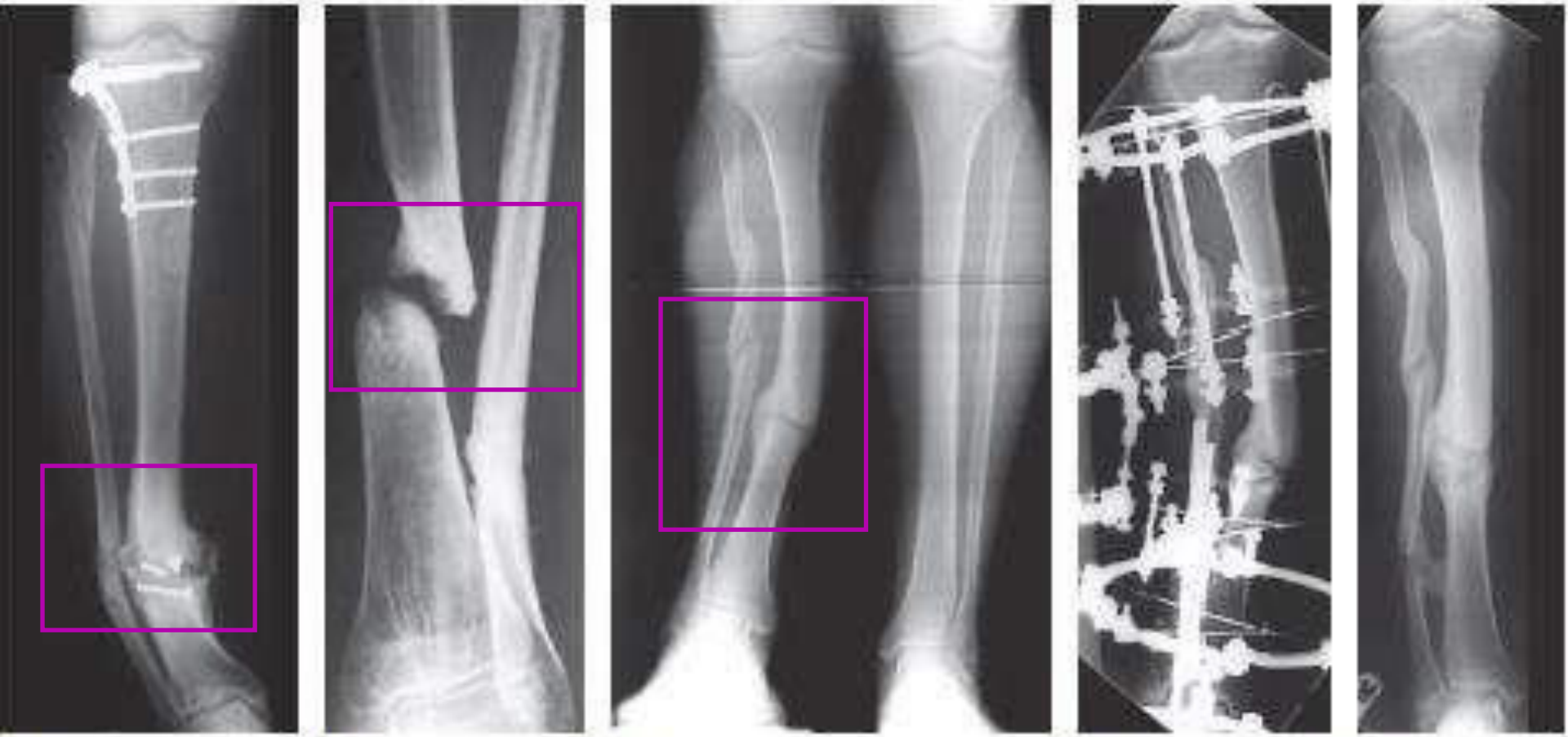
movement,
wrong reduction
Inadequate immobilization
Inadequate stabilization

Dx?

Atrophic non-union

Causes?

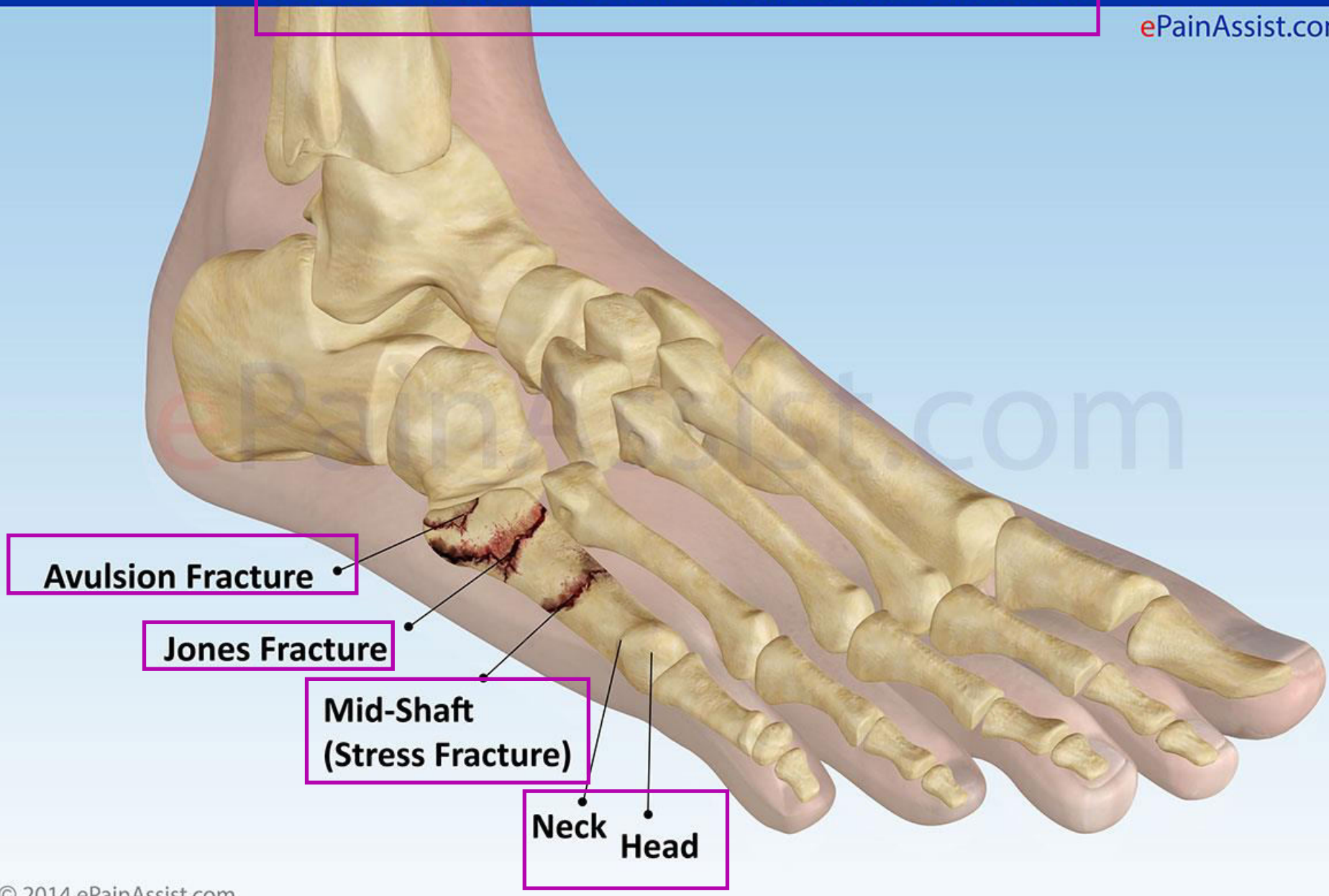
vascular causes (e.g.**impaired** blood supply) or metabolic causes (DM or smoking)



30.32 Fractured tibia and tibula – late complications
(a) *Hypertrophic non-union*: the exuberant callus formation and frustrated healing process are typical. (b) *Atrophic non-union*: there is very little sign of biological activity at the fracture site. (c) *Malunion*: treated, in this case, by gradual correction in an Ilizarov fixator (d,e).

ألصور التالية غير موجود شرحها ب سلايدات المادة لكن وجدت ب السنوات, يجب دراستها.....

Jones Fracture or 5th Metatarsal Fracture

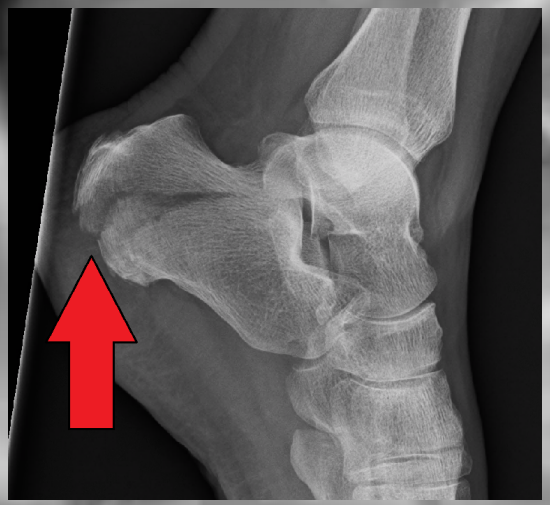


Dx?

Avulsion of the 5th Metatarsis bone

* Jones fracture
* peroneus brevis Tendon

Dx?
Calcaneus Fracture



Dx?

Talus

Fracture

AVN

Jones Fracture

"caused by a twisting injury in the peroneal brevis and peroneal longus tendons, this leads to avulsion of the bone in the lateral side"

March Fracture

"a type of stress fracture that is caused by repeated minor trauma to the area, it can be mistaken with malignancy on X-ray"

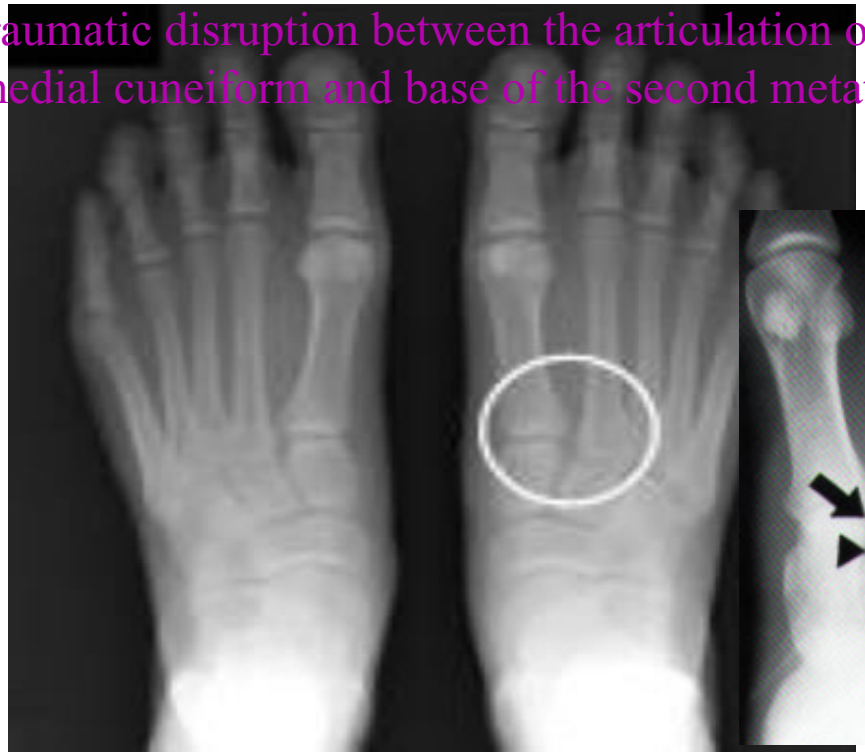
March Fracture

Lisfranc Fracture

"injury to the metatarsal bones at the level of the tarsus, it is named after Lisfranc who was napoleon's personal doctor. We also Lisfranc joint & tendon.

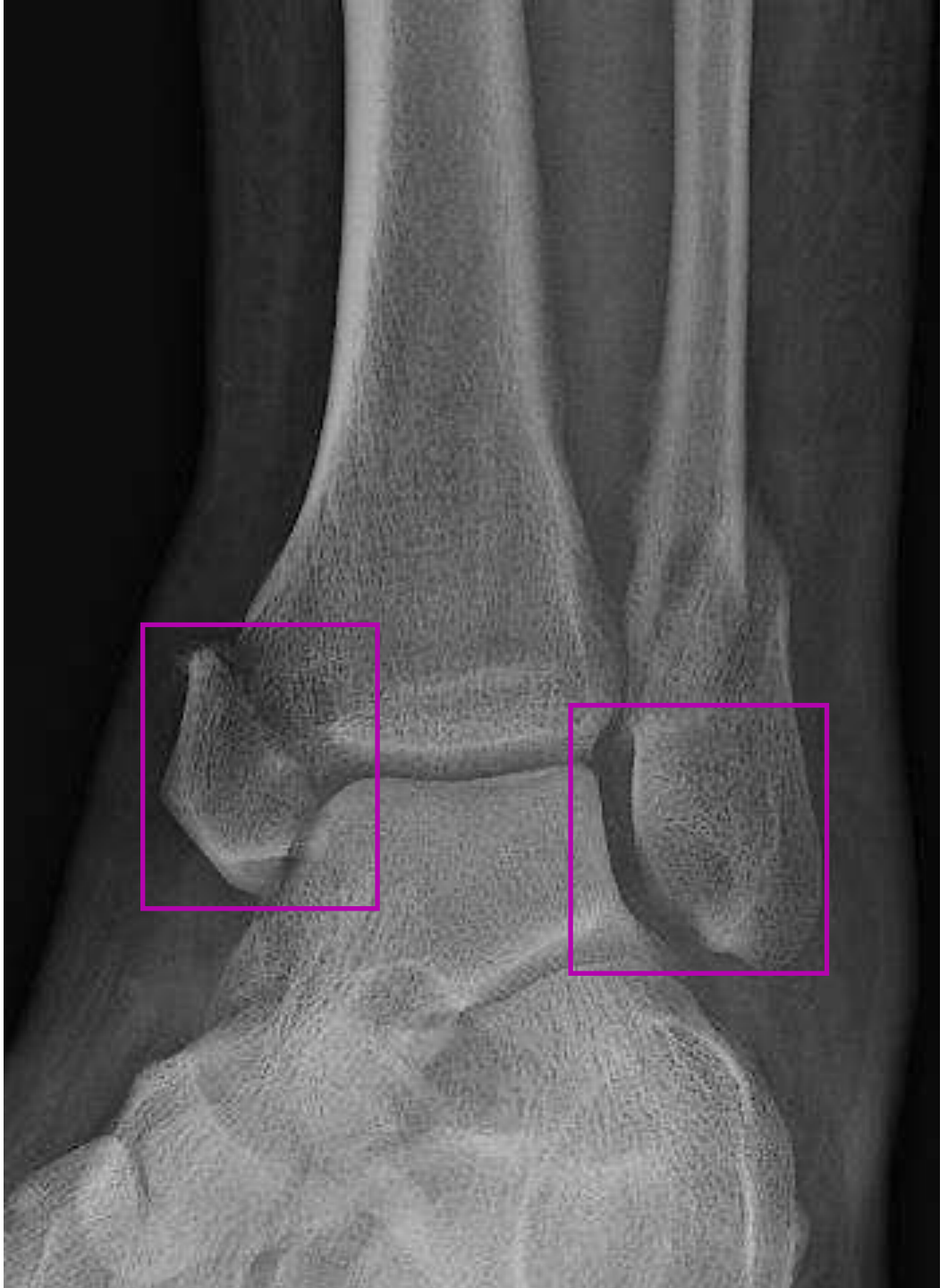
Treatment is anatomical reduction

a tarsometatarsal fracture dislocation characterized by traumatic disruption between the articulation of the medial cuneiform and base of the second metatarsal.



Dx?

Bimalleolar Ankle Fracture



Dx?

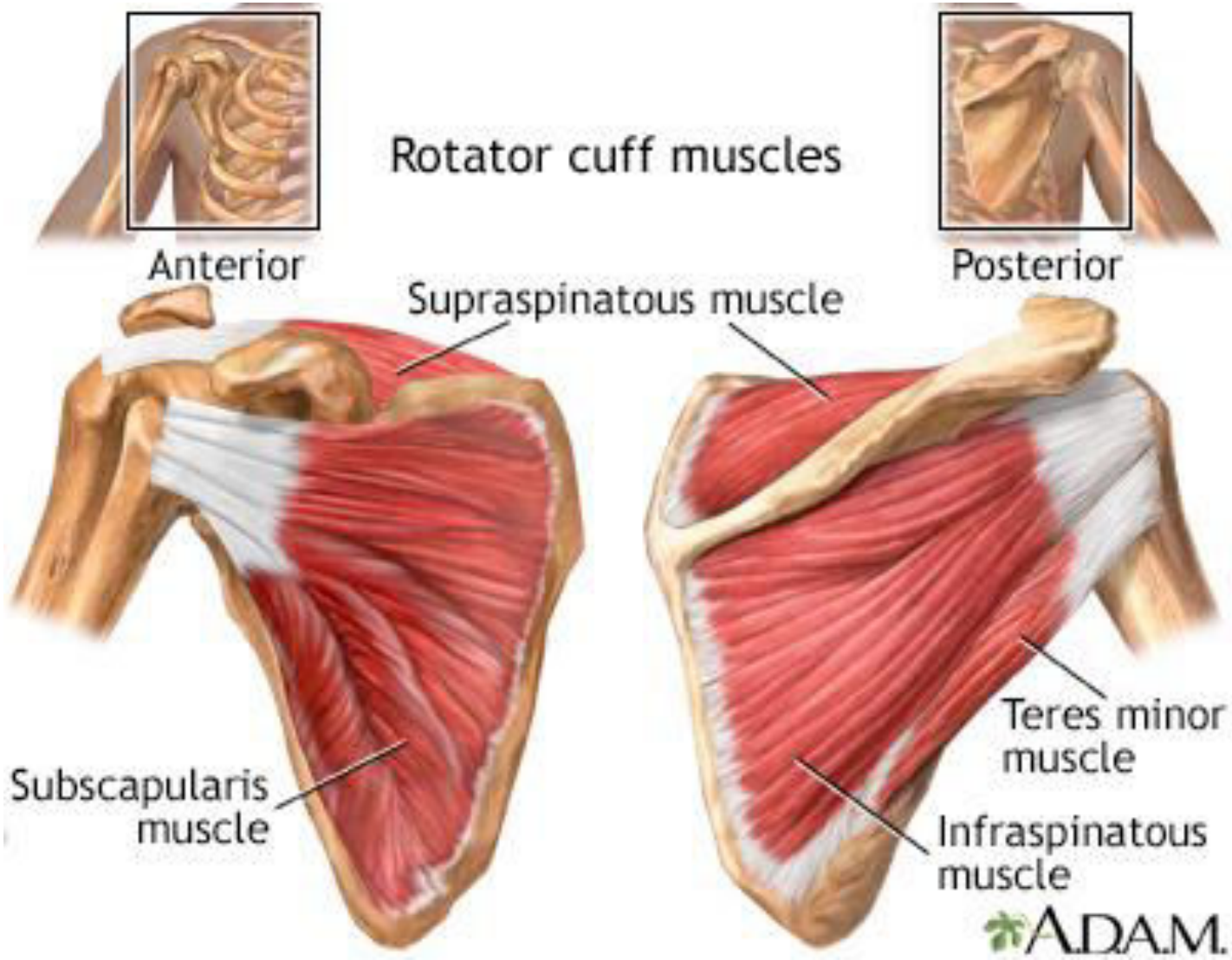
Pilon Fracture

A tibial plafond fracture (also known as a pilon fracture) is a fracture of the distal end of the tibia, most commonly associated with comminution, intra-articular extension, and significant soft tissue injury.

Hawkins Sign in talar fracture

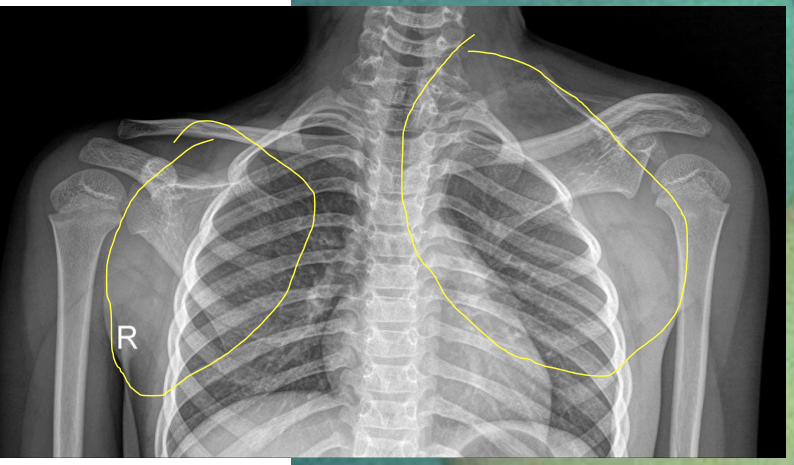
Shoulder Disorders :

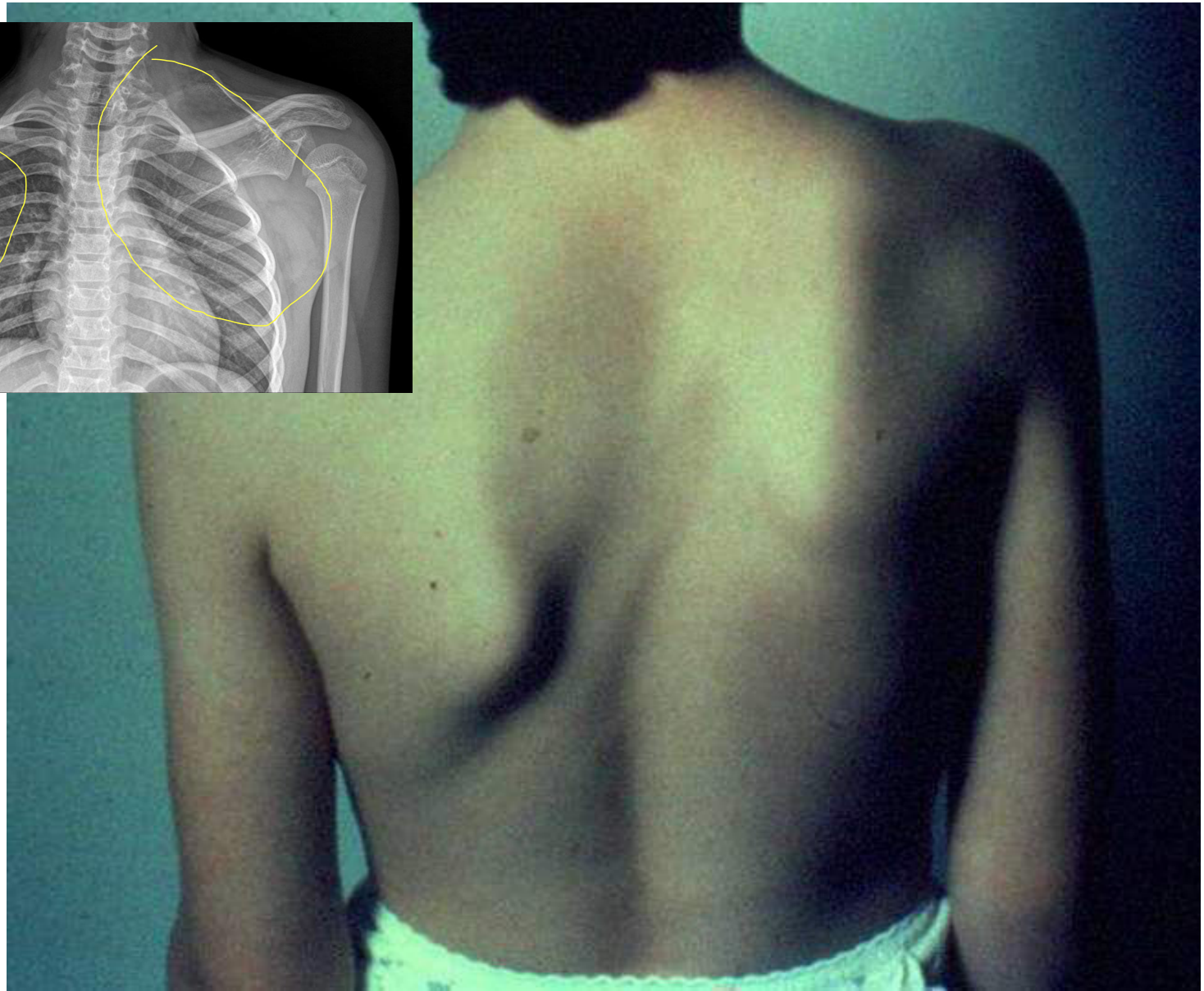
Supraspinatous	Initiate abduction	Suprascapular nerve
Infraspinatous	External rotation	Suprascapular nerve
Teres minor	External rotation	Axillary nerve
Subscapularis	Internal rotation	Subscapular nerve



- **What is your Dx ?**
  - Winged scapula
- **The affected nerve is ?**
  - Long thoracic nerve" Nerve to serratus anterior "

Springle Shoulder





Rare continental dz, in which the scapula is too high in one side

Ttt by observation in the absence of shoulder dysfunction

Operative management in cars of severe cosmetic concerns or functional deformities
Abd <110_120

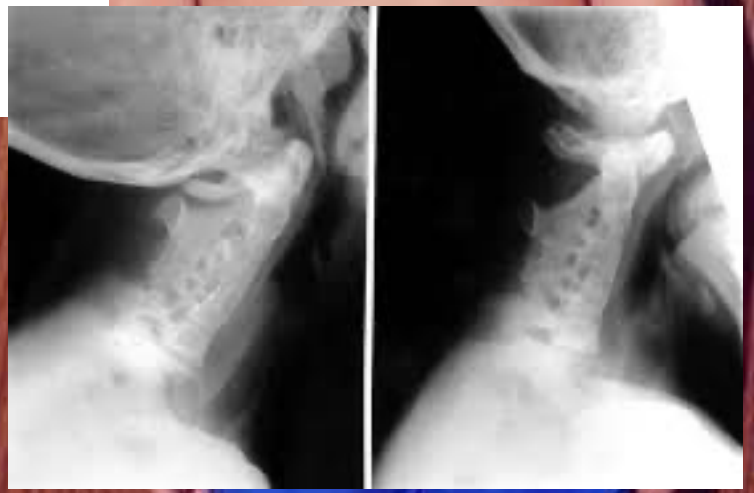
Klippel Feil

Rare dz in which 2 or more vertebrae in the neck are fused together from birth

Those people have short neck and may have hearing loss

Dx by observation

Ttt by surgery to correct neck bones



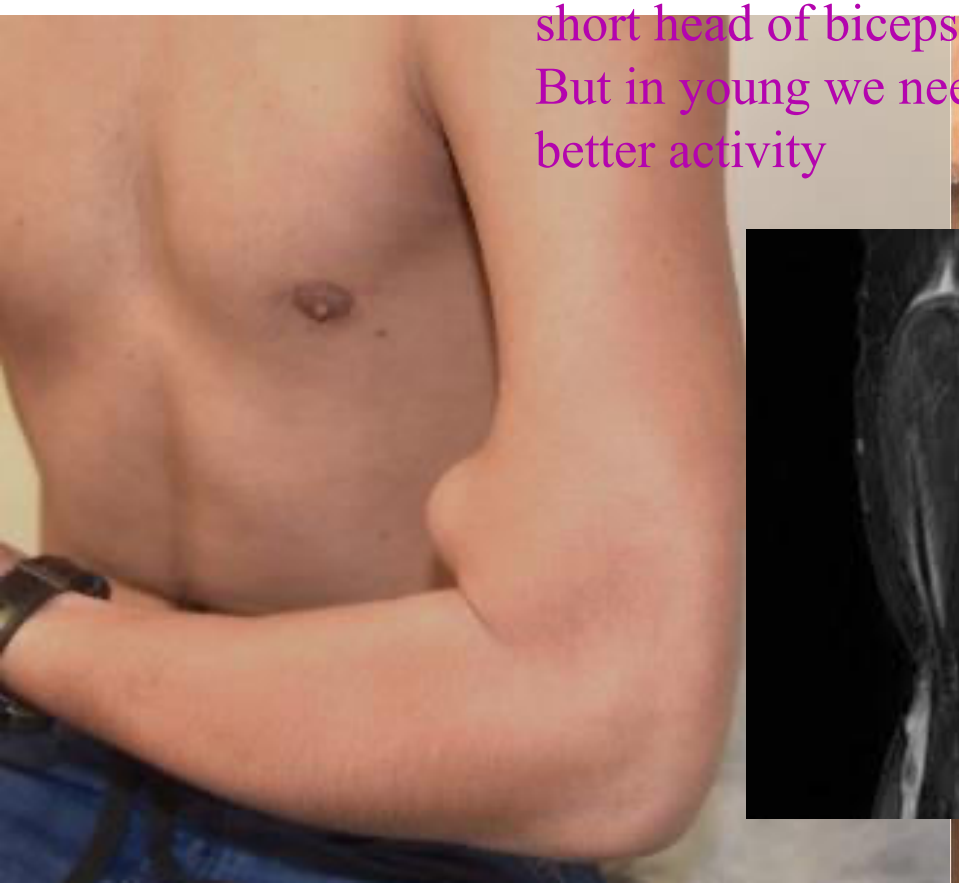
Popeye sign

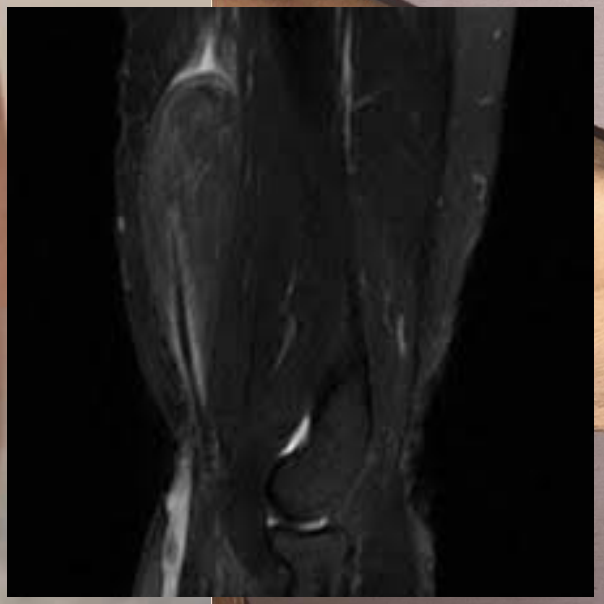
Biceps Tendon Rupture

Due to rupture of the long head of biceps

Treatment : In elderly conservative as they are still able to us ethe short head of biceps

But in young we need to repair due to their need of more power for better activity



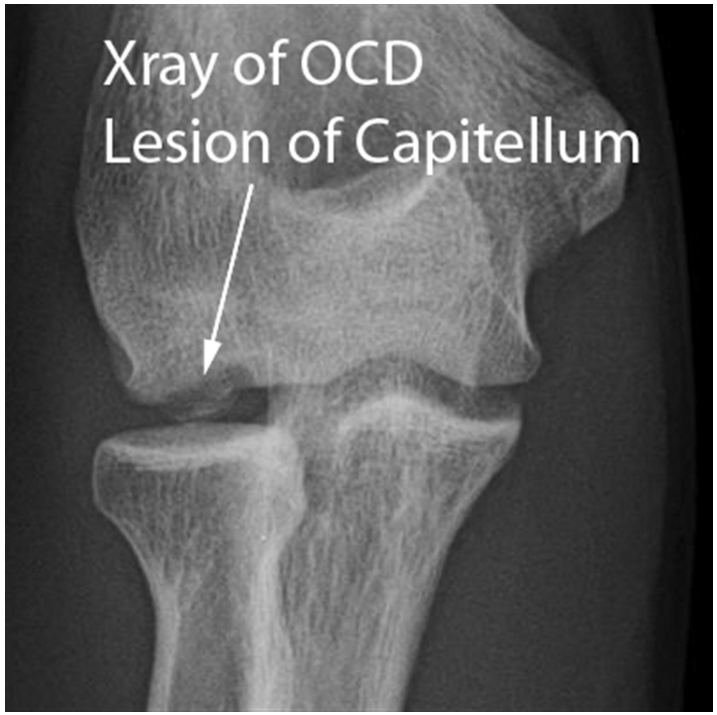


Milwaukee shoulder refers to a destructive shoulder arthropathy due to the deposition of hydroxyapatite crystals, and identification of these crystals in synovial fluid is the cornerstone of diagnosis.

Treatment is usually supportive; resting the affected joint and the use of nonsteroidal anti-inflammatory agents

Elbow Disorders :

Osteochondritis dissecans (OCD)

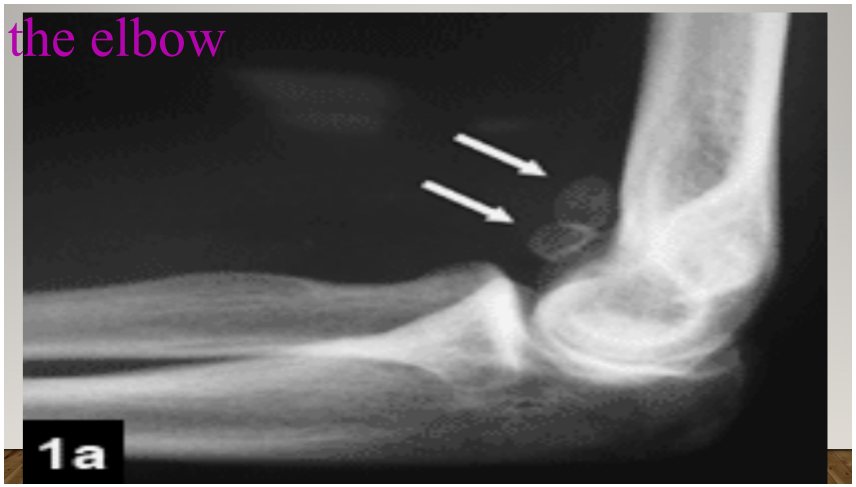


Capitellum is a common site in the elbow for OCD

Clinically --> Locking

occurs when the blood supply to the elbow joint is restricted or cut off, which causes the bone under the cartilage to die

OCD is a common cause of loose bodies in the elbow



What is the diagnosis of this condition?

Cubitus varus (vara)

What is the cause of this condition?

- malunion of supracondylar fracture / supracondylar fracture of the distal humerus

What is the diagnosis?

Cubitus valgus In which there's increasing in carrying angle

What is the cause?

Non union of lateral condyle

Most Common complication:

Ulnar nerve

Neuropathy & palsy

In general, if it doesn't compress the ulnar nerve,then you won't need ttt

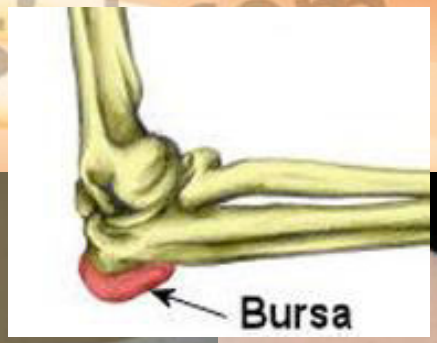
However, it's treated either by osteotomy or fixation

Also, the nerve palsy can be treated by some OTC medication

Students Elbow or Olecranon Bursitis

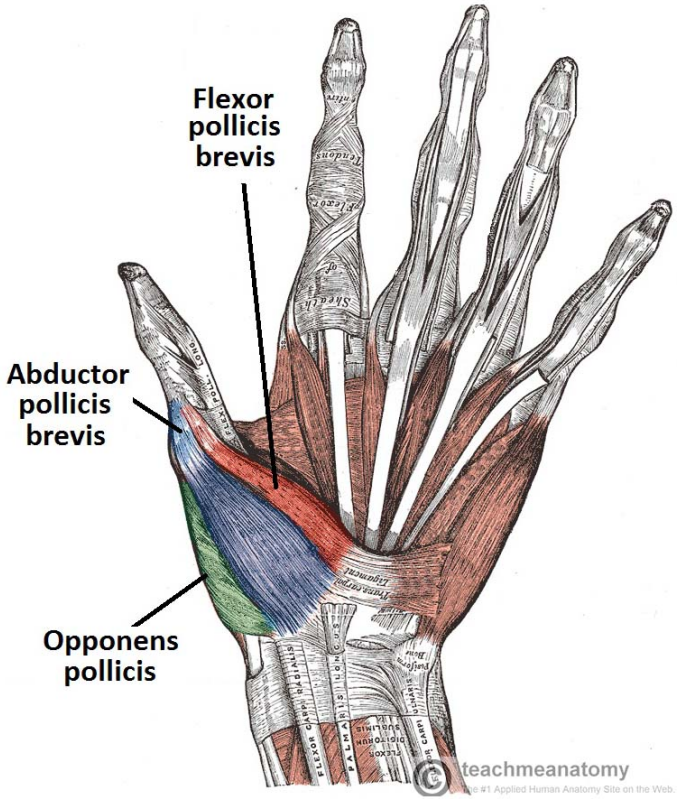
It is a condition where there is swelling, redness and inflammation of the bursa that protects the bone at the posterior side of the elbow.

we need to exclude infection first by aspirating the bursa

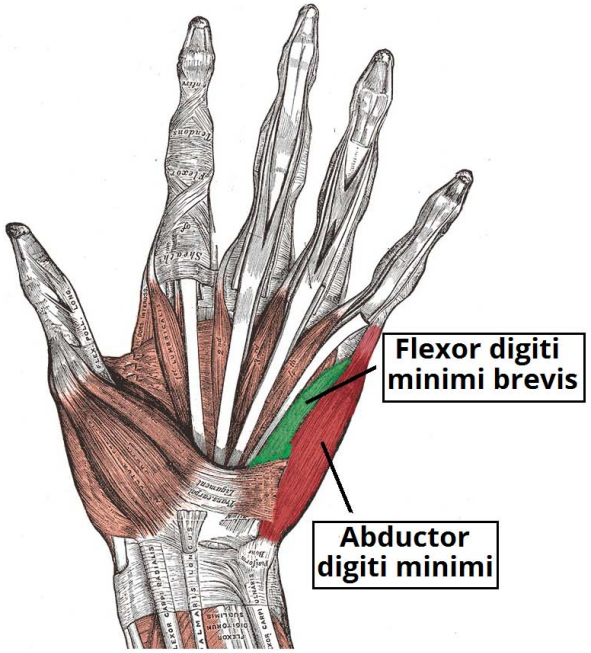


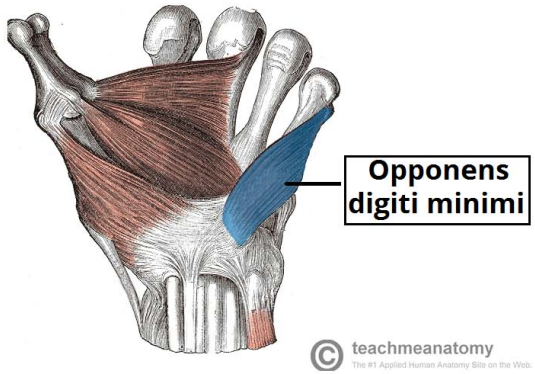
favorite site for gout (Urate crystals)
and common site for pseudogout (calcium pyrophosphate dihydrate (CPPD) crystals

Wrist and Hands Disorders :



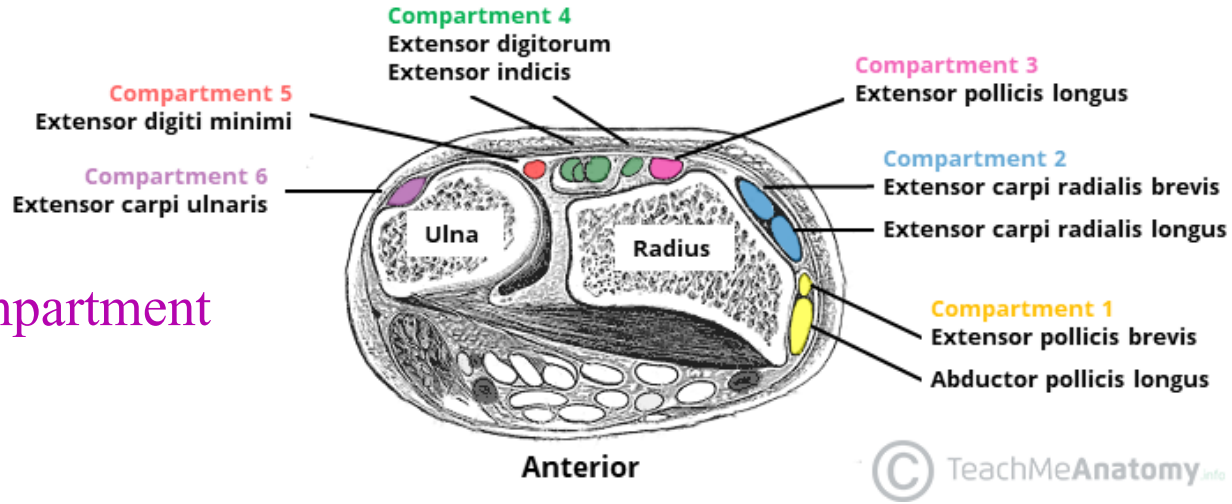
Thenar Muscles



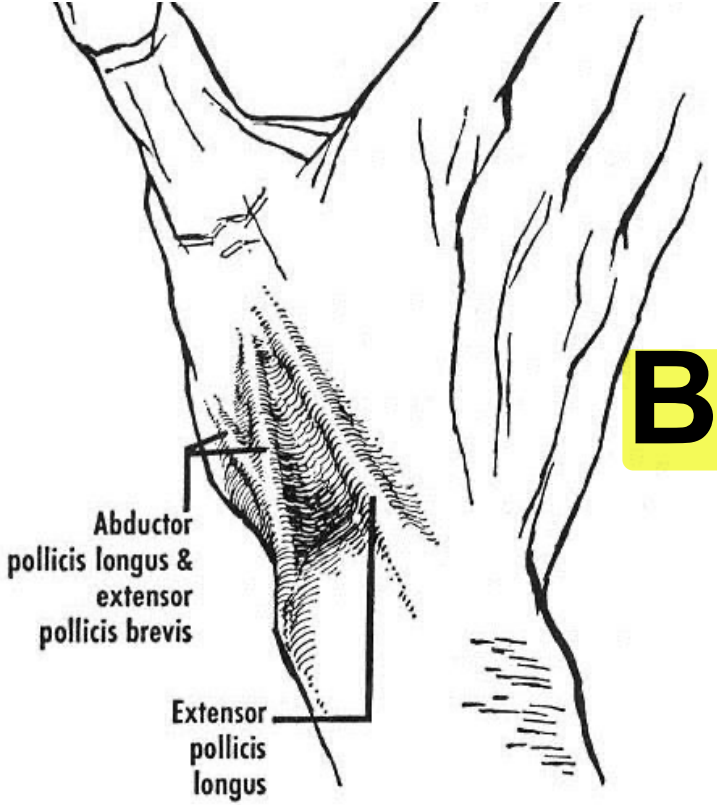


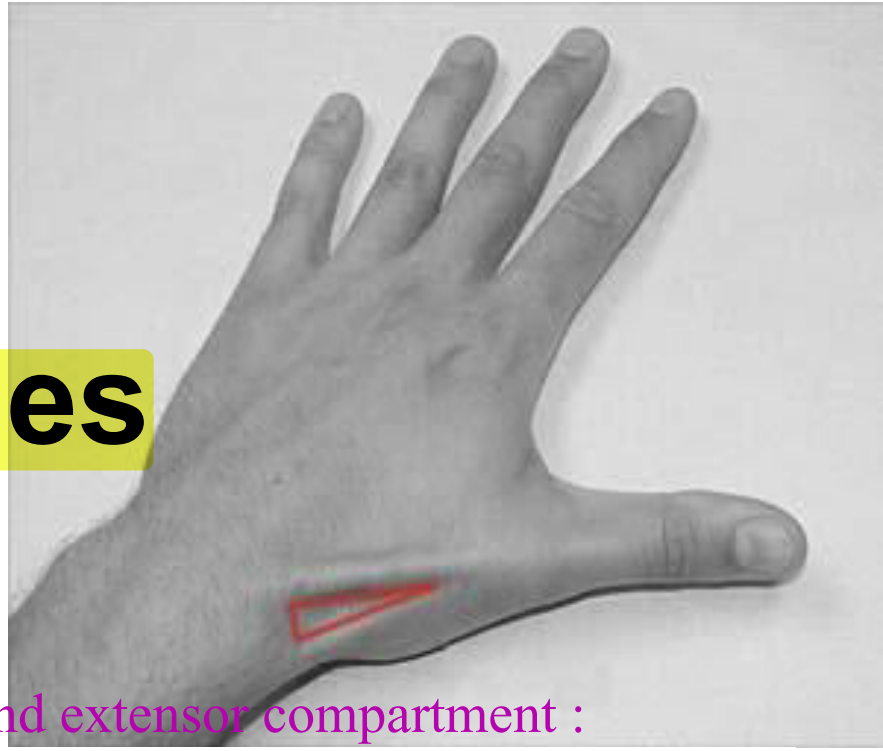
Hypothenar muscles

Extensor compartment

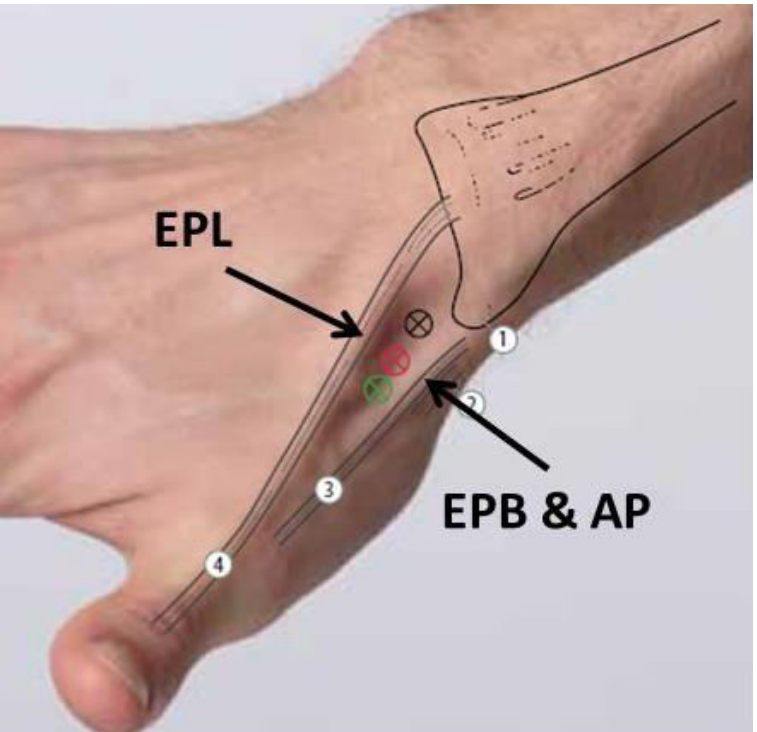


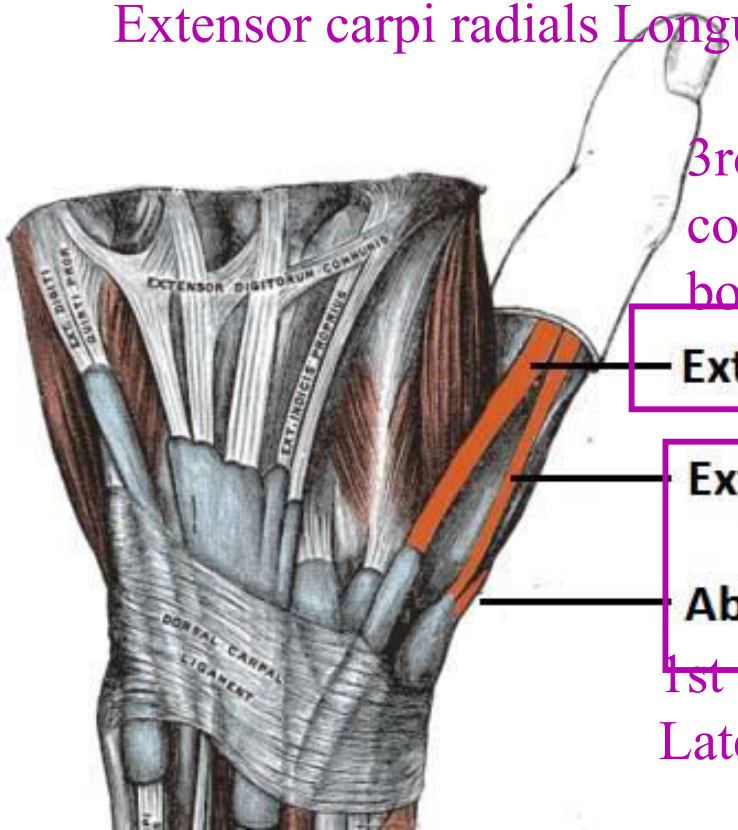
Snuff Box Boundaries





in the floor (2 nd extensor compartment : Extensor carpi radials Longus and brevis)



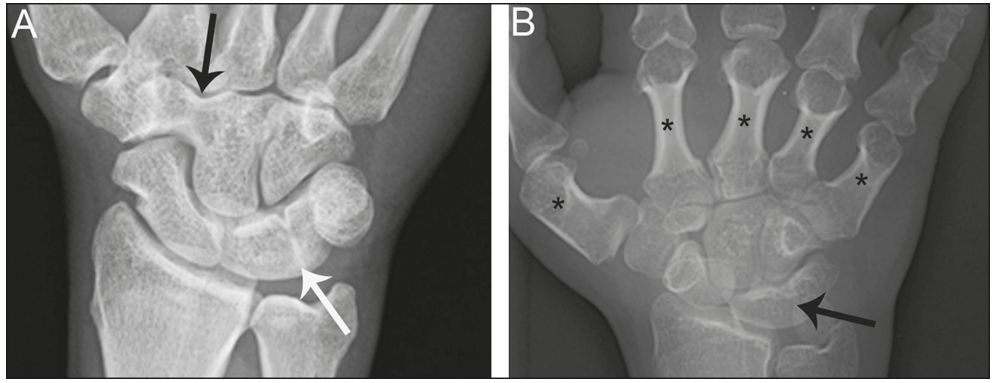


3rd Extensor compartment (Medial border)

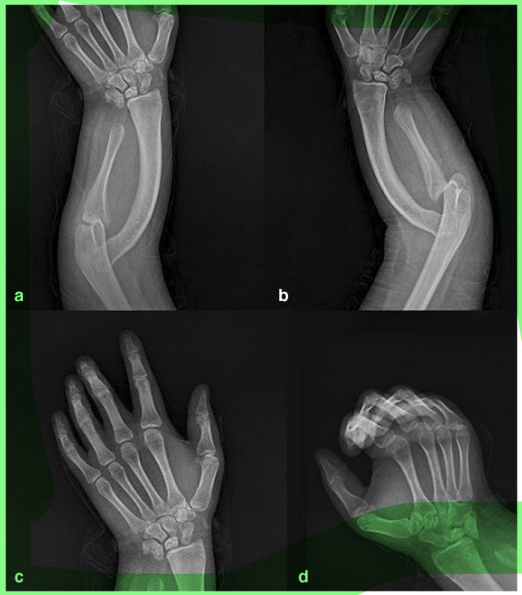
- Extensor pollicis longus
- Extensor pollicis brevis
- Abductor pollicis longus

1st extensor compartment (Lateral Border)

carpal coalition syndrome :a genetic condition characterized by fusion of the bones in the wrist (carpals)

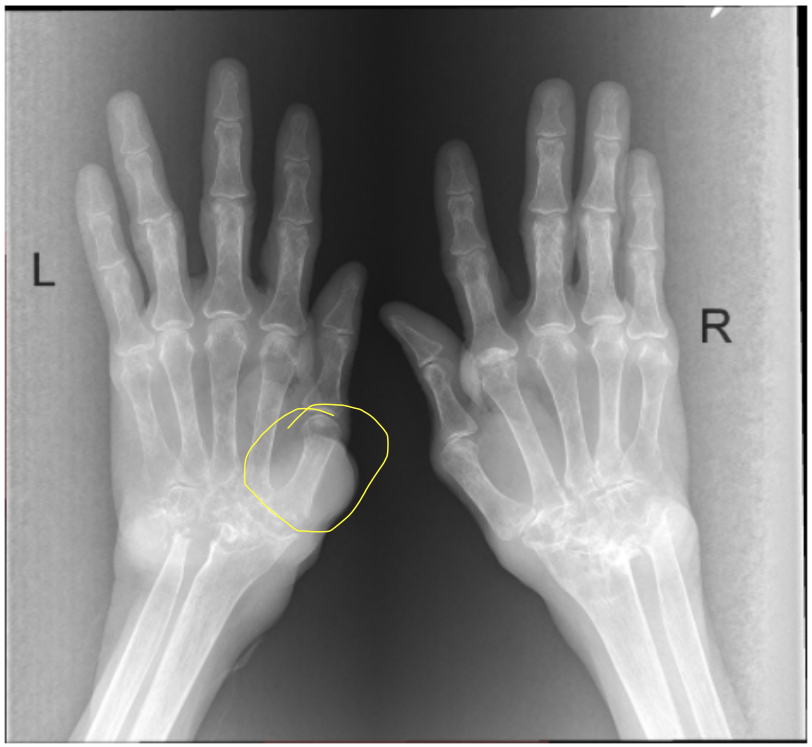


Ulnar hemimelia :complete or partial absence of the ulna bone



Arthrogryposis multiplex congenita :small and large joints (contractures)

RA in the Wrist



severe osteopenia with soft tissue swelling around the wrists, erosion of the distal radius and ulna, severe narrowing of the radiocarpal joint with carpal ankylosis and destruction of the intercarpal articulations.

OA in the 1st carpometacarpal joint

extensor carpi ulnaris: most commonly affected in RA, it ruptures causing deformity at the wrist.

Constriction bands

Happens when fibrous bands of amniotic sac get tangled around a developing fetus

If it doesn't interfere with the function then it doesn't need any surgery but if it's deeper amniotic band then they may need surgery

Marfan's syndrome (spider hands)

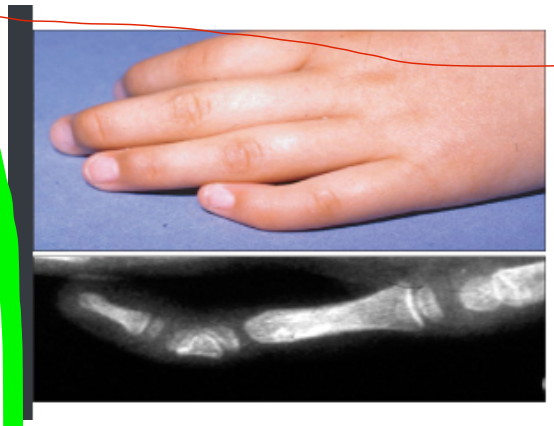
Camptodactyly

rare congenital condition of the hand that is characterized by a digital flexion deformity that usually occurs in the PIP joint of the small finger.

The child has a bent finger that they can't completely straighten

achondroplasia trident hand

Results from mutation in protein synthesis (point mutation)



Clinodactyly

: is a congenital condition of the hand, often associated with Down's syndrome, that is characterized by the abnormal curvature of a digit in the radioulnar plane.

The child has a finger that curves to one side

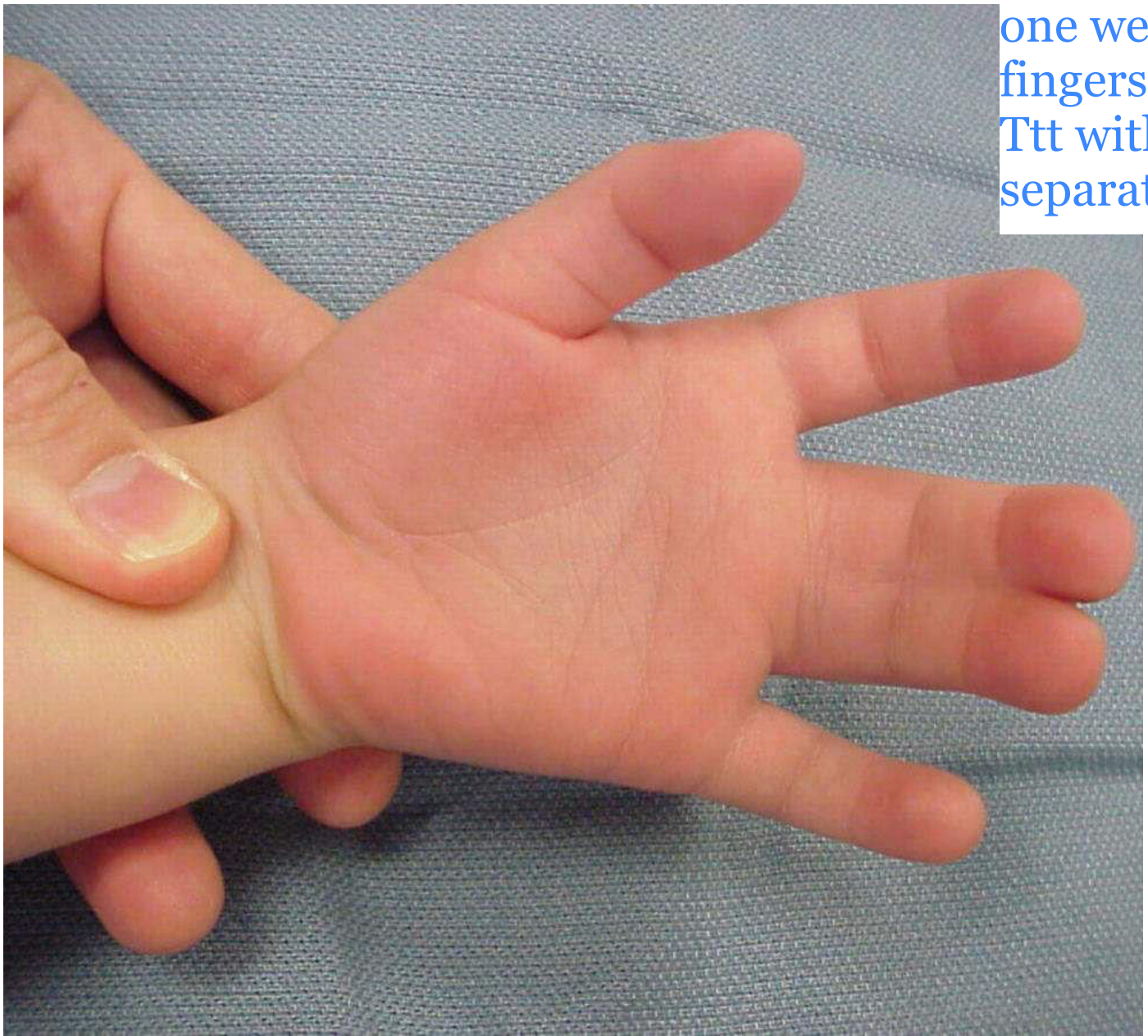
Radial Dysplasia

Radial Club Hand

The infant is born with the wrist in marked radial deviation. There is absence of the whole or part of the radius, and usually also the thumb.

Ttt maybe observation or surgical reconstruction when the child is around 6 months of age

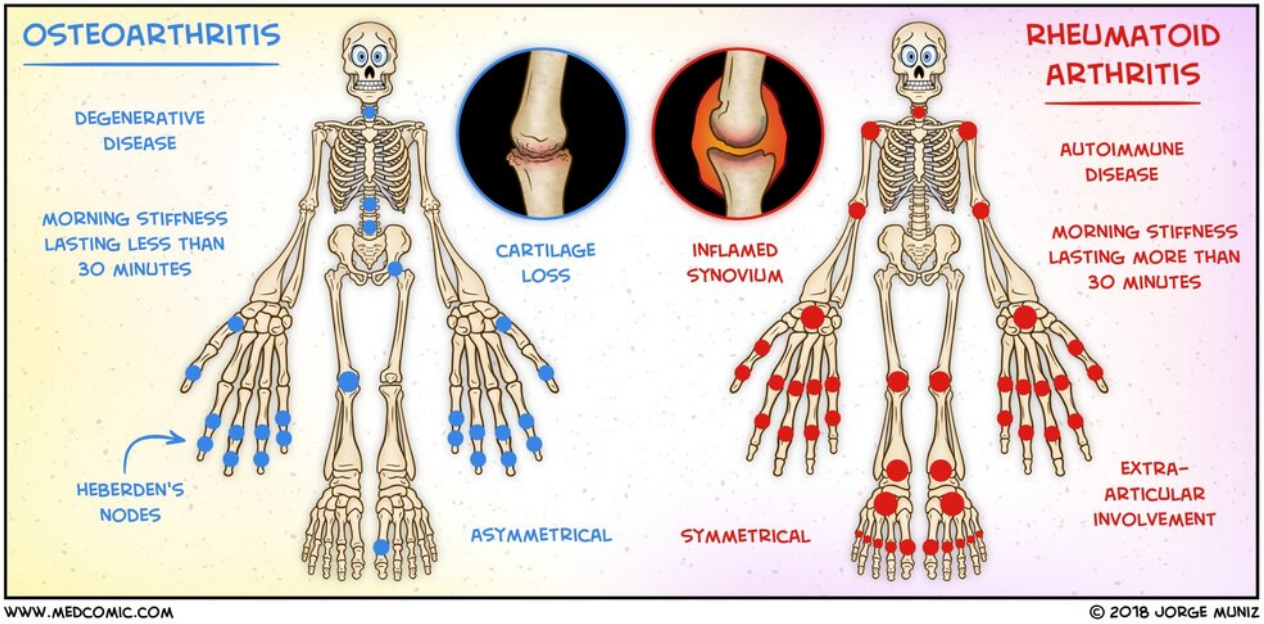
Dx? Syndactyly

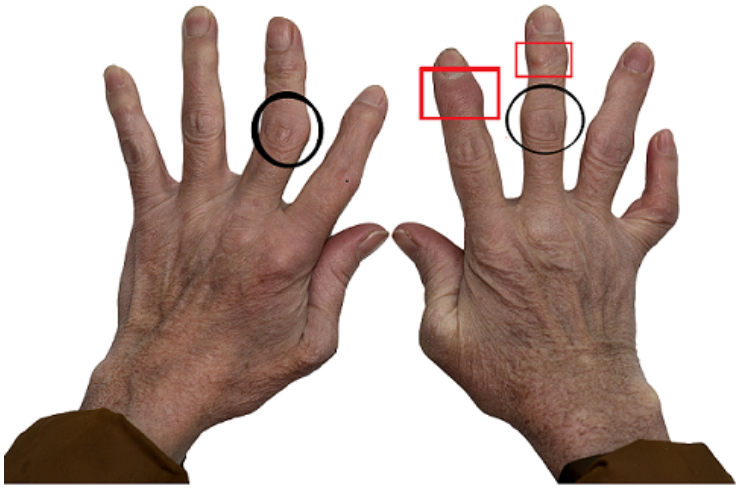


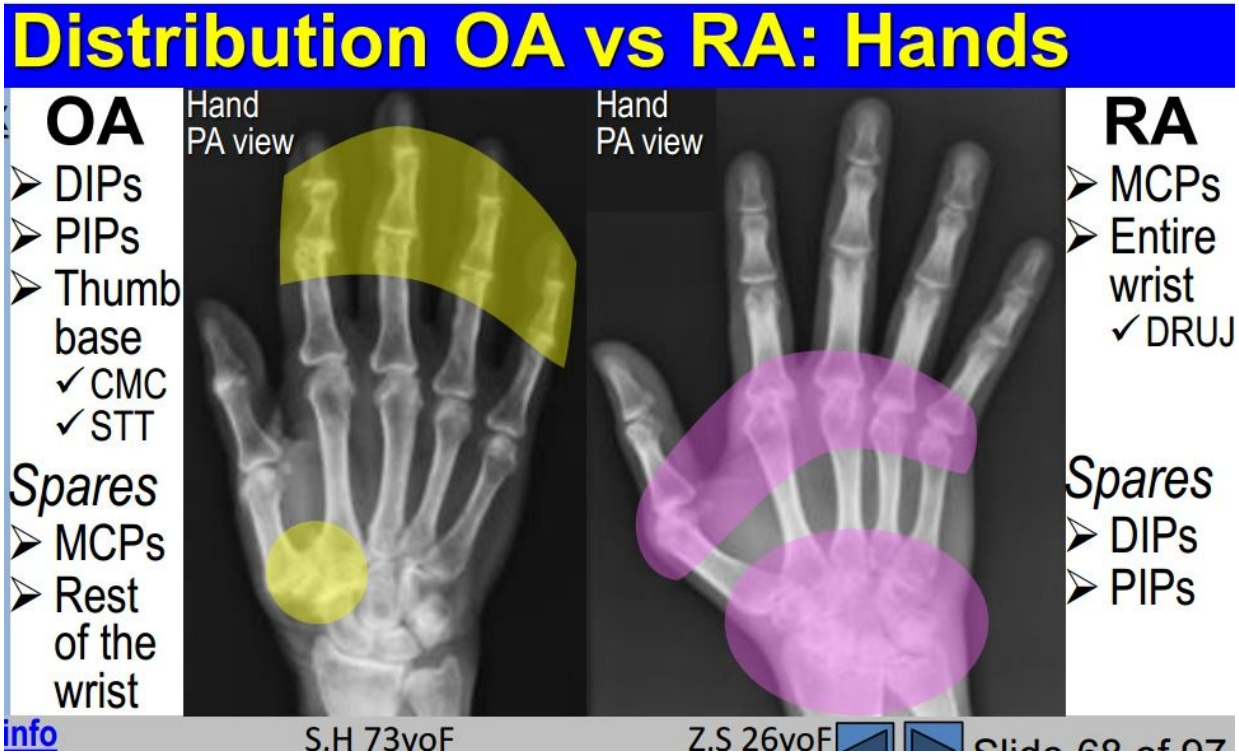
The children are born with fused one webbed fingers
Ttt with surgery to separate them

Dx? Polydactyly

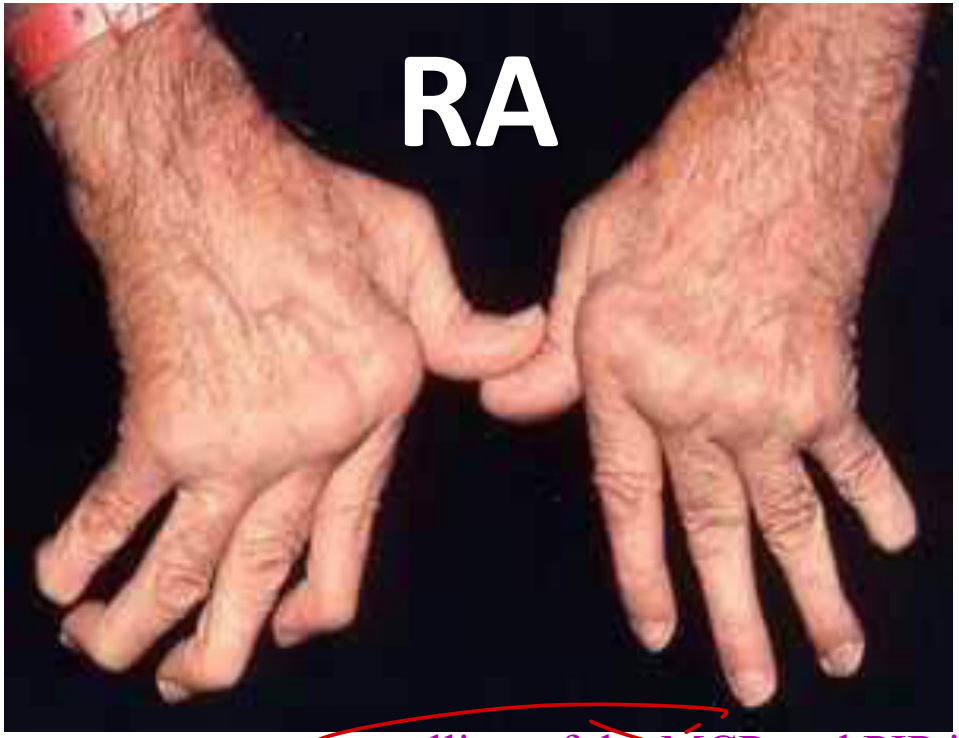
Baby born with one or more extra fingers
The MC ttt is to remove the extra finger







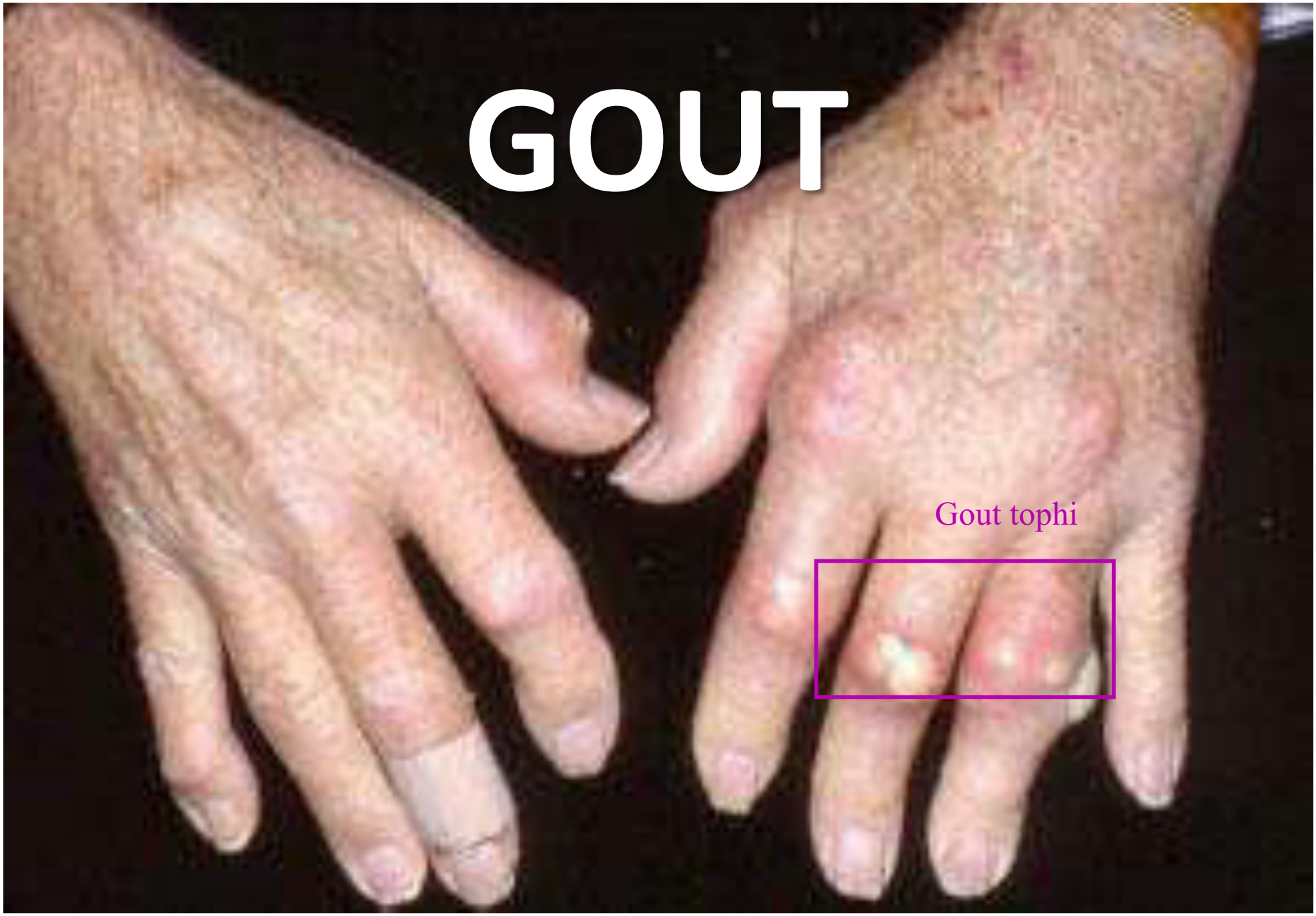
Heberden's nodes : bony thickening around the DIP joints -restriction of movement. -Not infrequently, some of the PIP joints are involved (Bouchard's nodes)



:swelling of the MCP and PIP joints; both hands are affected, more or less symmetrically.

RA

) ulnar deviation of the fingers
2)subluxation of the MCP joints
3)swan-neck or boutonnière deformities


GOUT
Gout tophi

Dx?

TB of wrist joint

Multiple lytic lesions in the carpal bones

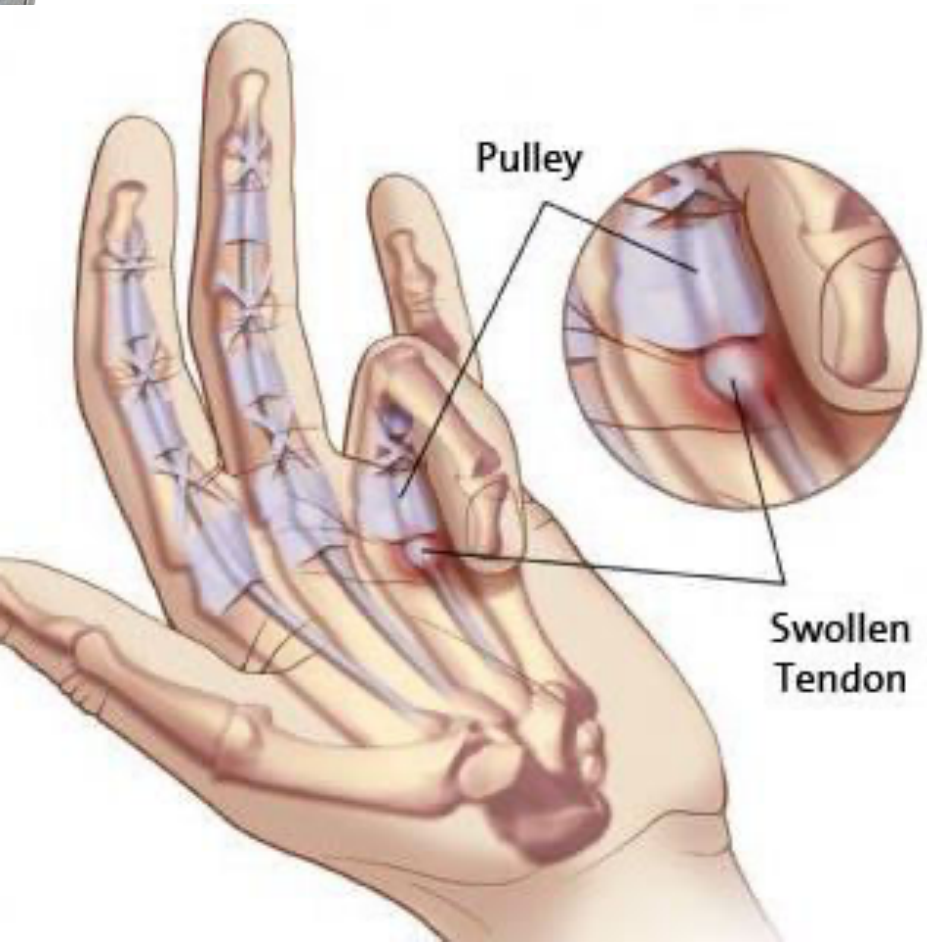
Narrowing

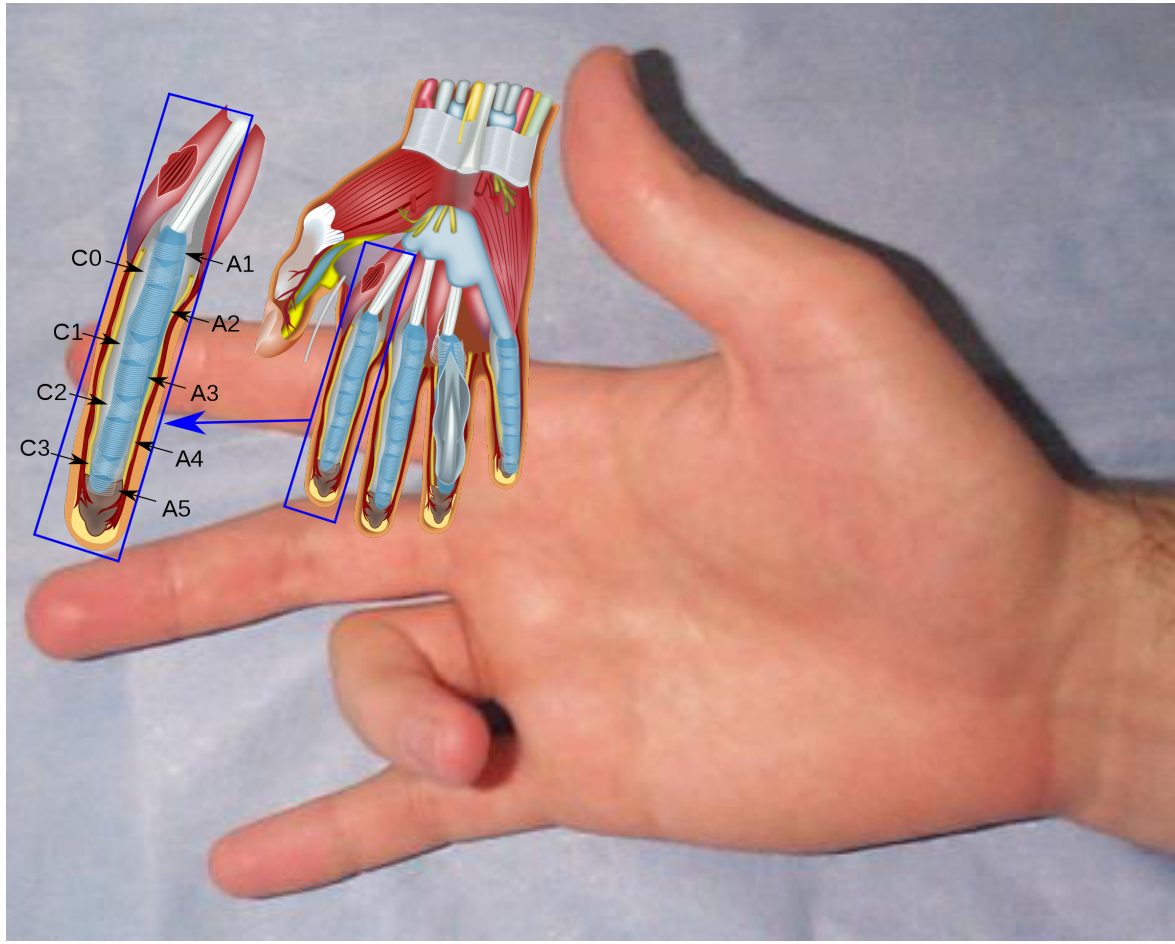
Trigger finger

thickening of the fibrous tendon sheath

is a condition that causes pain, stiffness, and a sensation of locking or catching when you bend and straighten your **finger**. The condition is also known as "stenosing tenosynovitis." The ring **finger** and thumb are most often affected by **trigger finger**

Common in diabetes





Dx? Dupuytrens Contracture

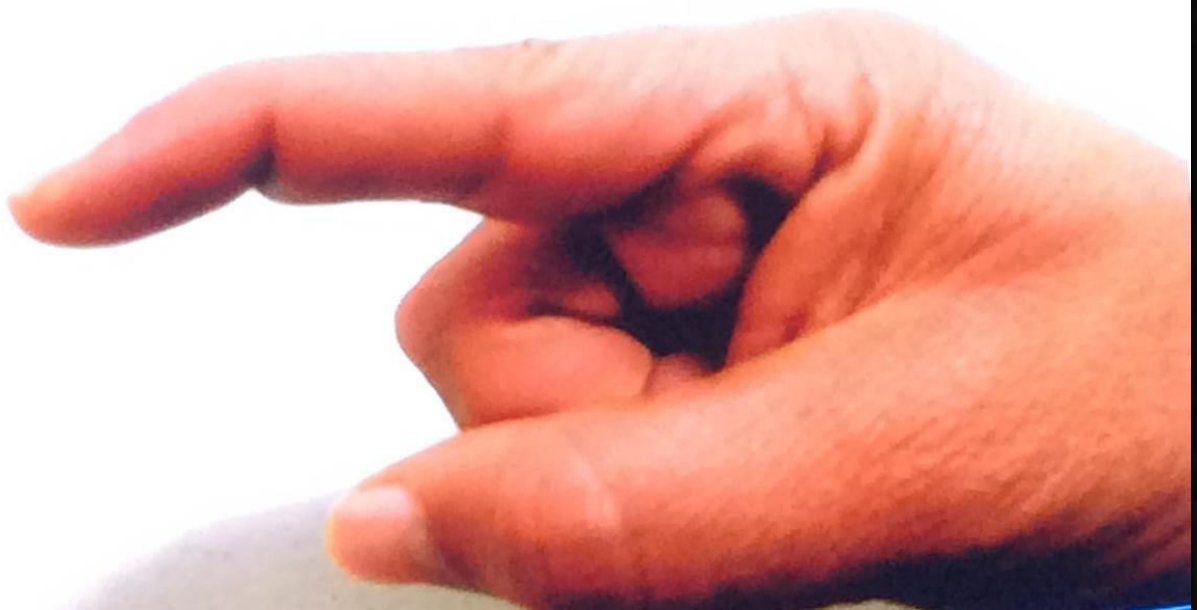
nodular hypertrophy and contracture of the superficial palmar fascia (palmar aponeurosis

high incidence in epileptics receiving phenytoin therapy; associations with diabetes, epilepsy, smoking, alcoholic cirrhosis, AIDS and pulmonary tuberculosis

Dx?

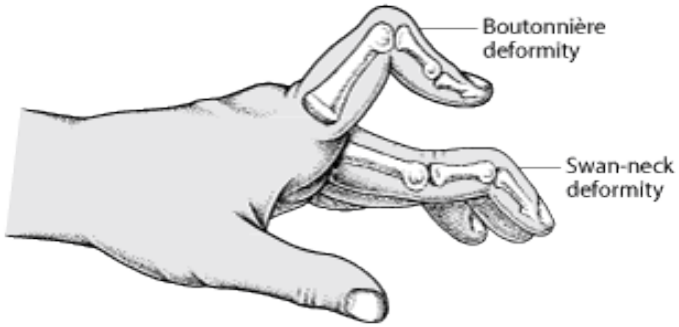
Mallet finger (Extensor Tendon Avulsion)

injury at the attachment of the extensor tendon to the terminal phalanx.



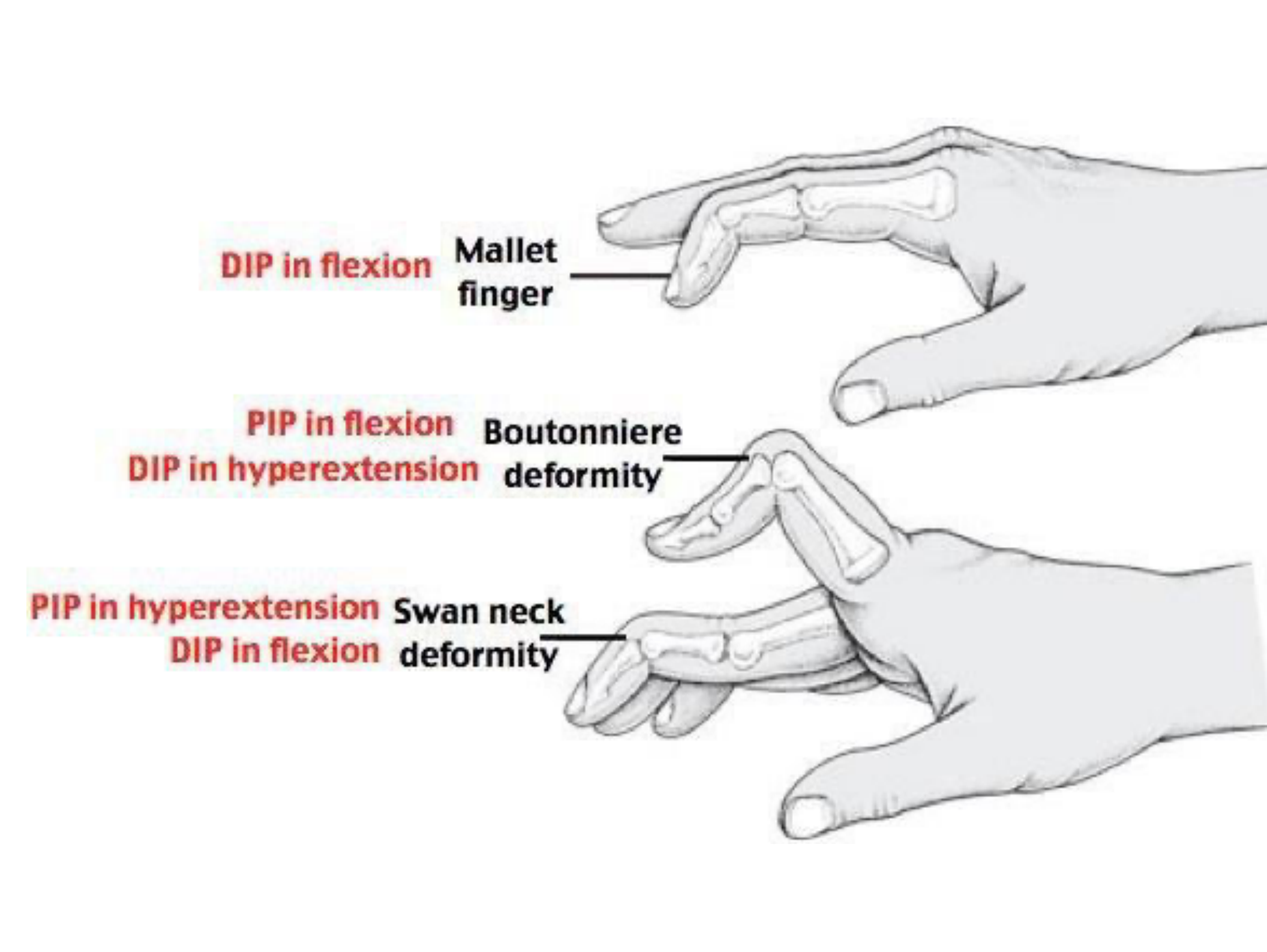
Extensor tendon injuries characterized by PIP flexion and DIP extension

--> Trauma or RA



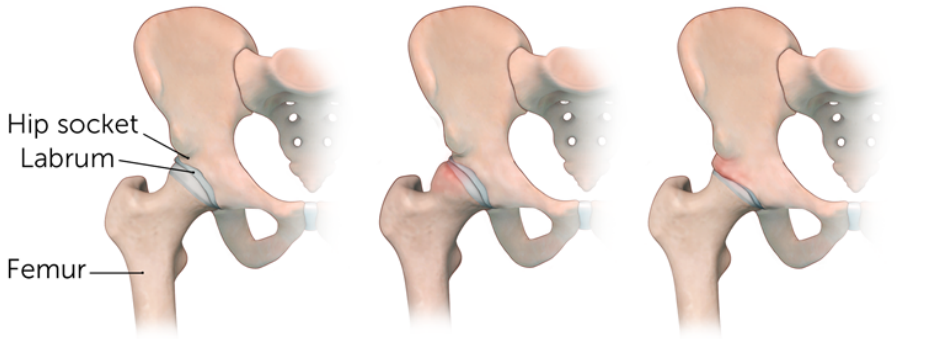
the PIP joint is hyperextended and the DIP joint flexed.

---> RA


DIP in flexion
Mallet finger
PIP in flexion
DIP in hyperextension
Boutonniere deformity
PIP in hyperextension
DIP in flexion
Swan neck deformity

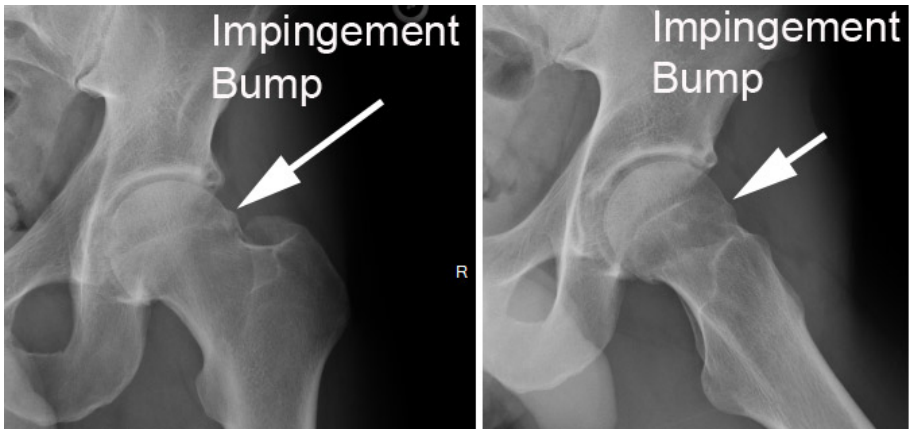
Hip Disorders :

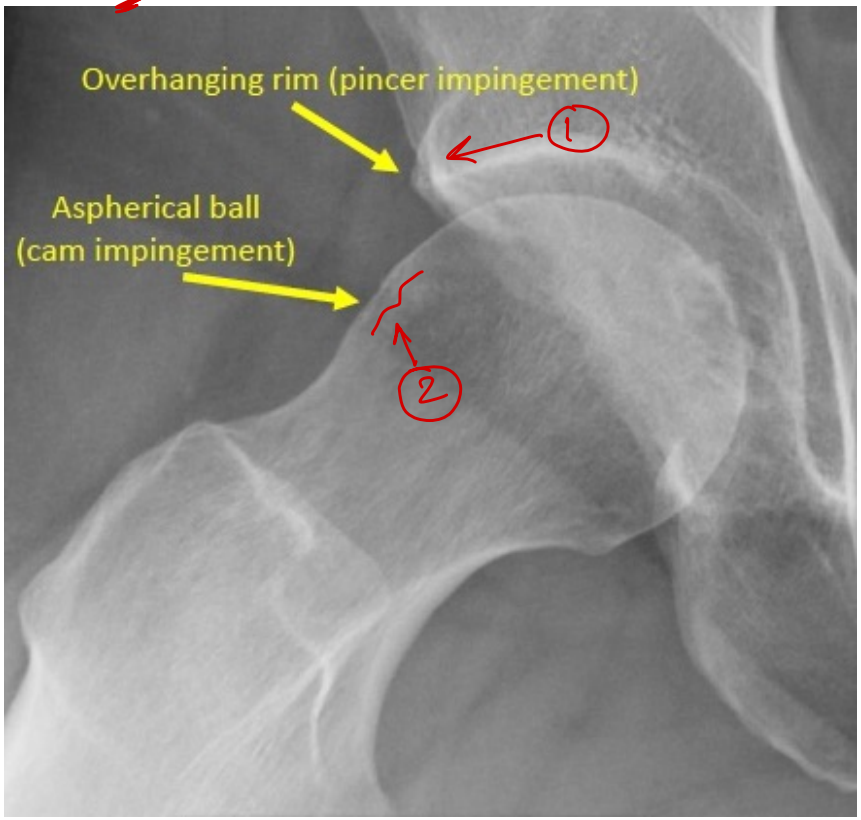
Femoroacetabular impingement



femur head

hip





The **hip abductor** muscles include the
- gluteus medius,
- gluteus minimus, and
- tensor fascia lata (TFL)

Nerve supply: *Superior gluteal nerve*
(branch of the sacral plexus)

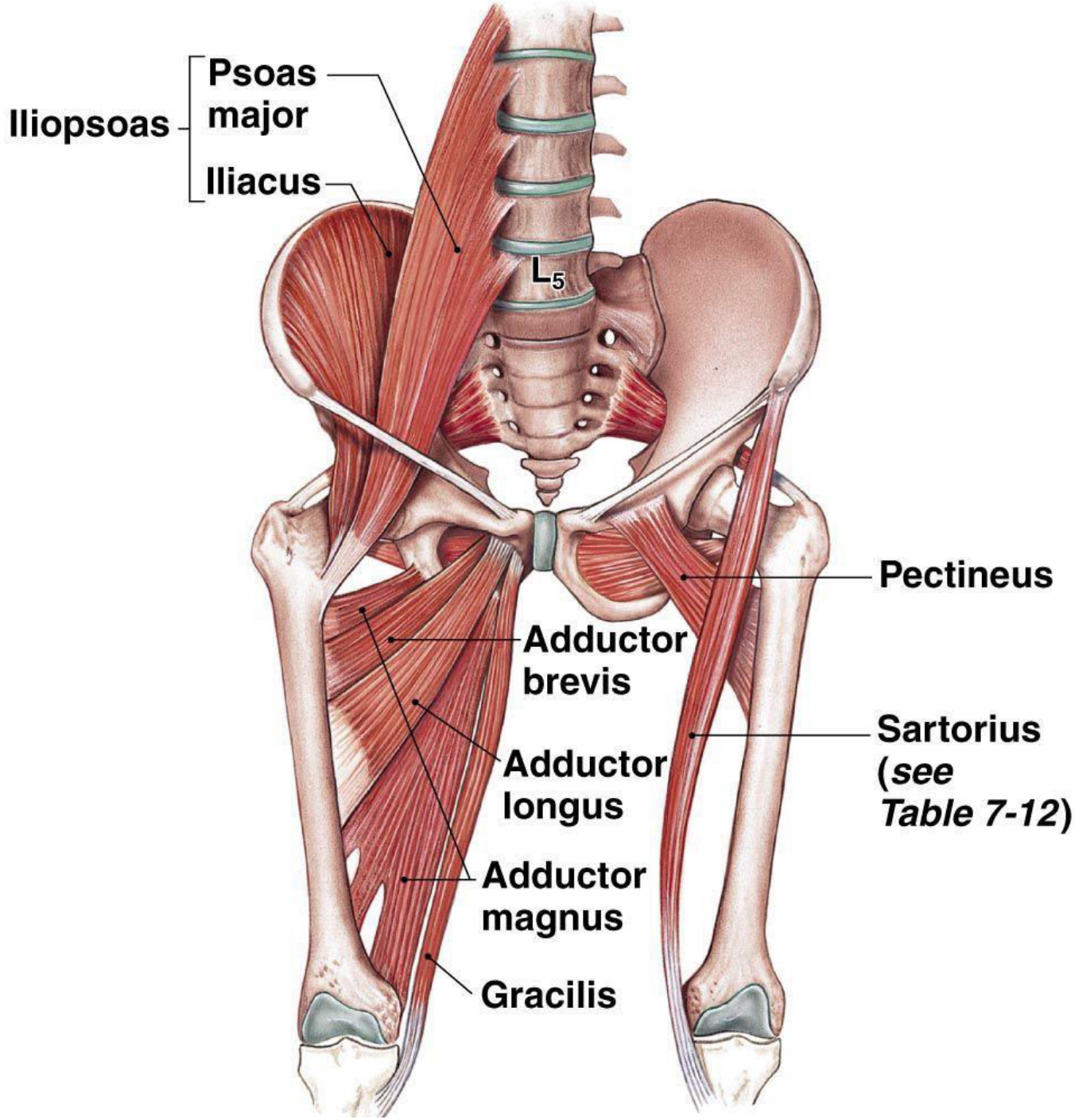
The **hip adductors** muscles include:

- adductor longus, and brevis, and magnus
- gracillis
- obturator externus

Nerve supply:

Obturator nerve

(branch of lumber plexus)



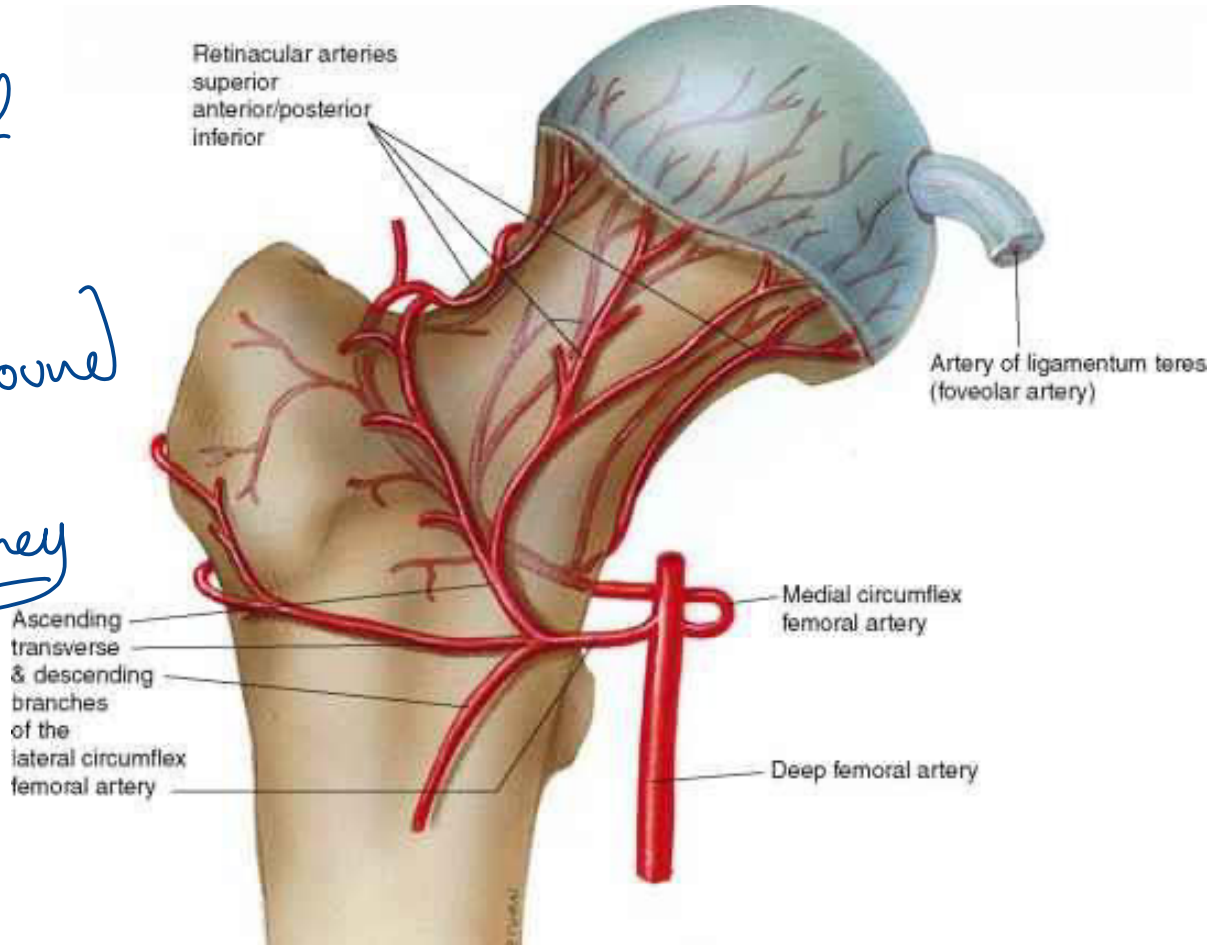
The **Femoral Head** blood supply:

- extracapsular arterial ring (LCFA, MCFA)
  - ascending cervical branches
  - artery to ligamentum teres:
    obturator artery or MCFA

1- lateral branch of MCFA

2- Ascending of LCFA

3- Artrey of Round ligament from Obturator Artrey



Dx? Bilateral Protrusion Acetabuli

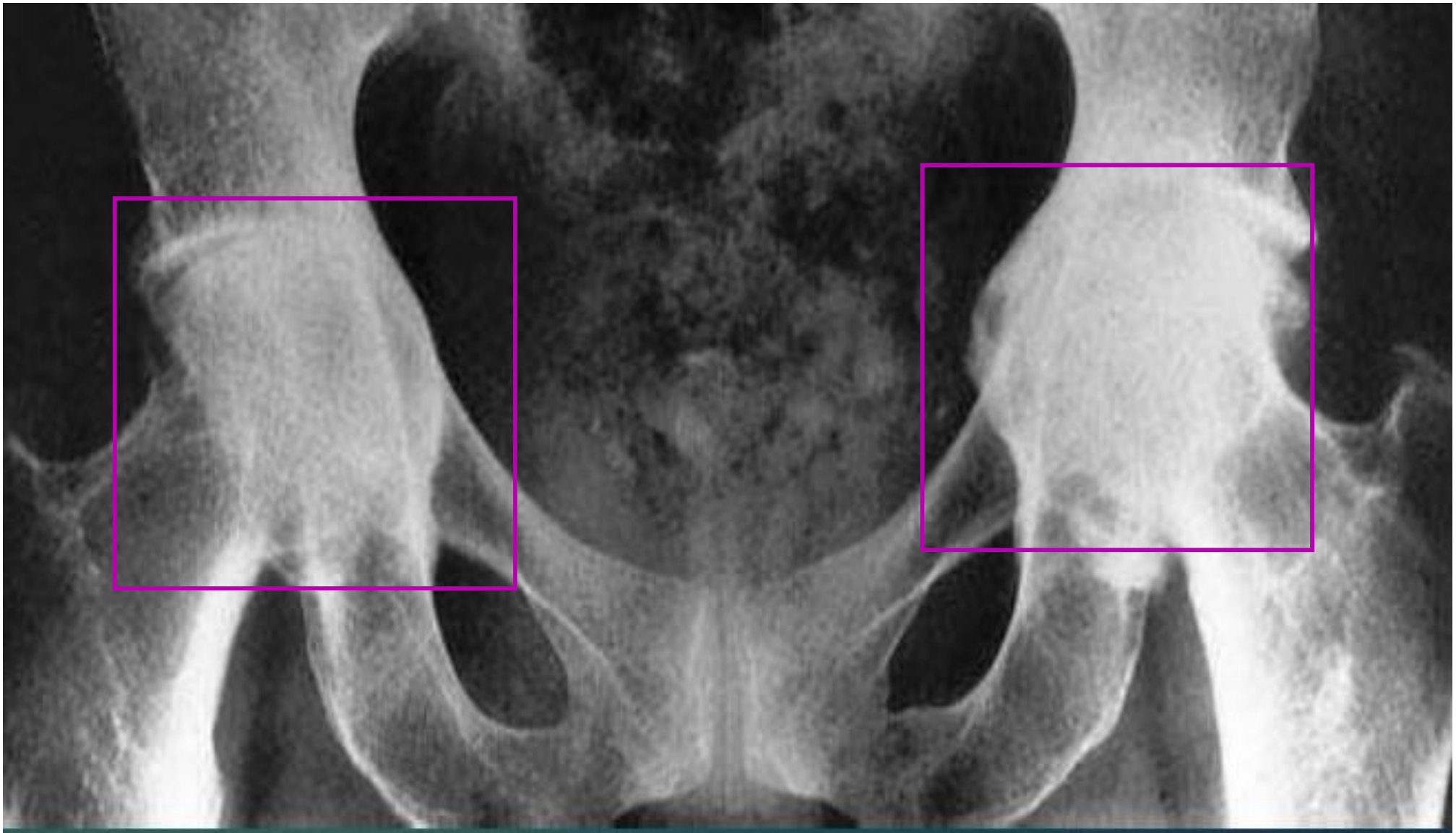
Causes: Paget, RA, Osteomalacia, Trauma

Dx? Bilateral Protrusion Acetabuli

Causes: Paget, RA, Osteomalacia, Trauma

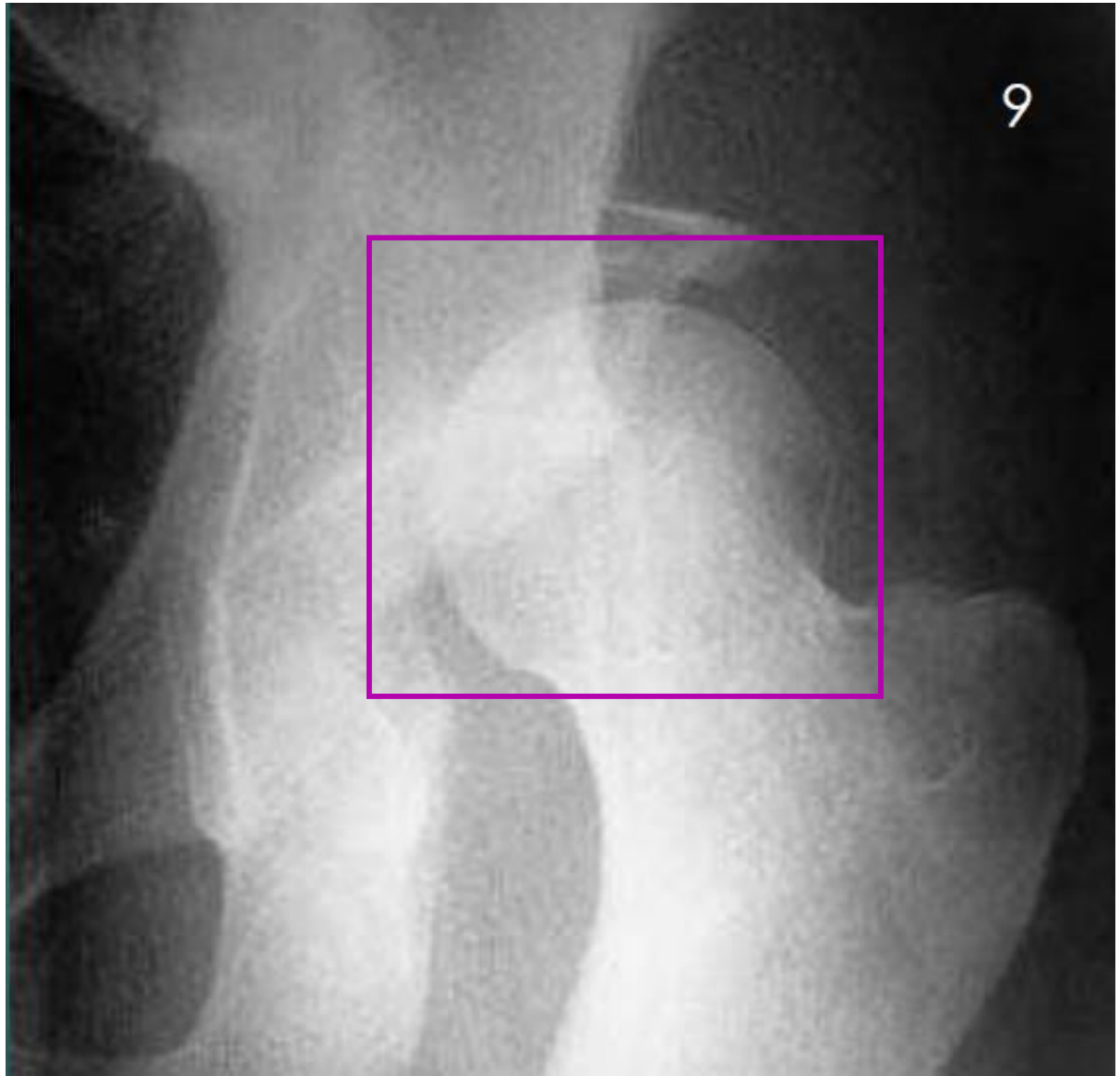
---> Sunken Acetabulum

---> Wibergs Angle > 40

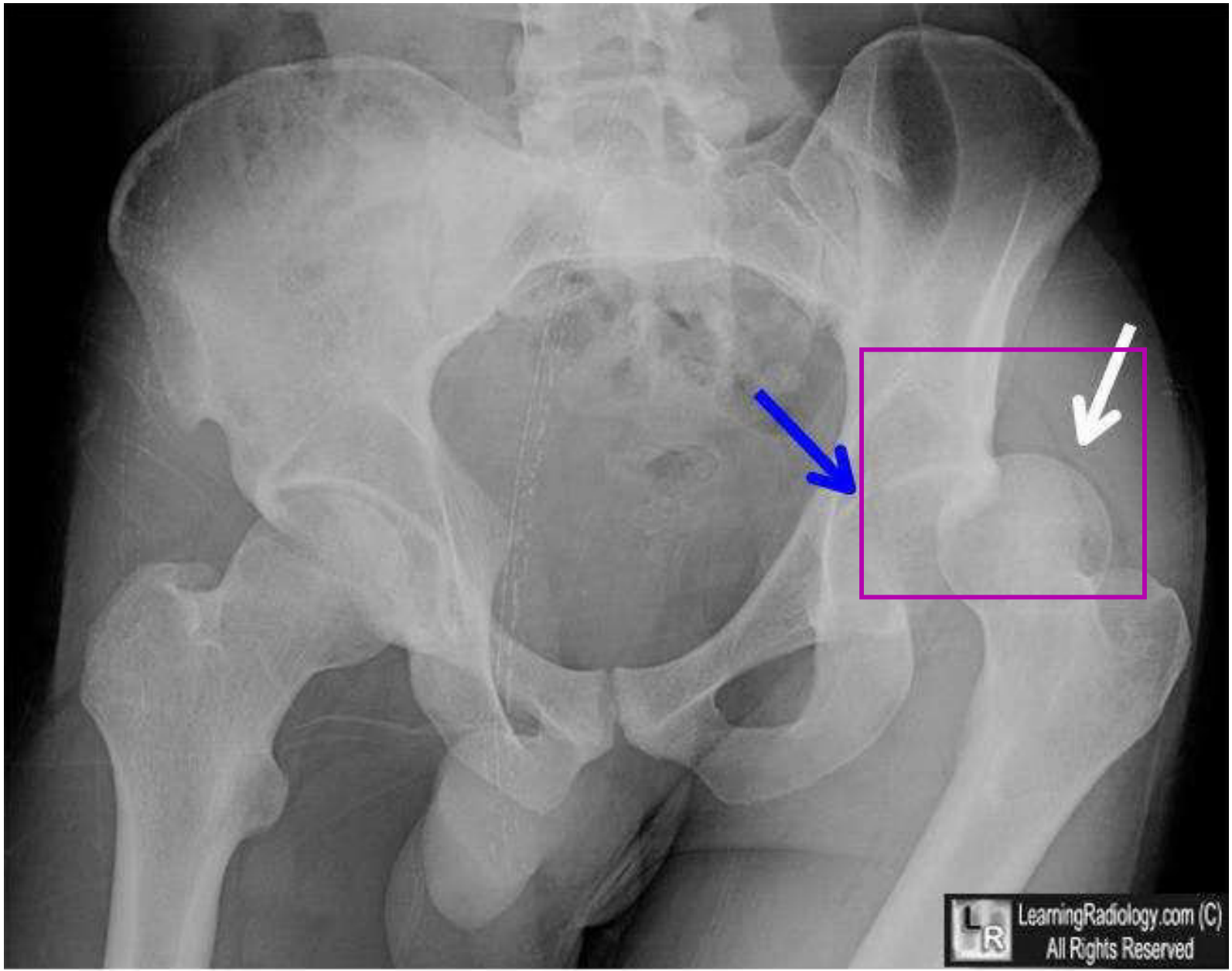


Dx? Hip Dislocation

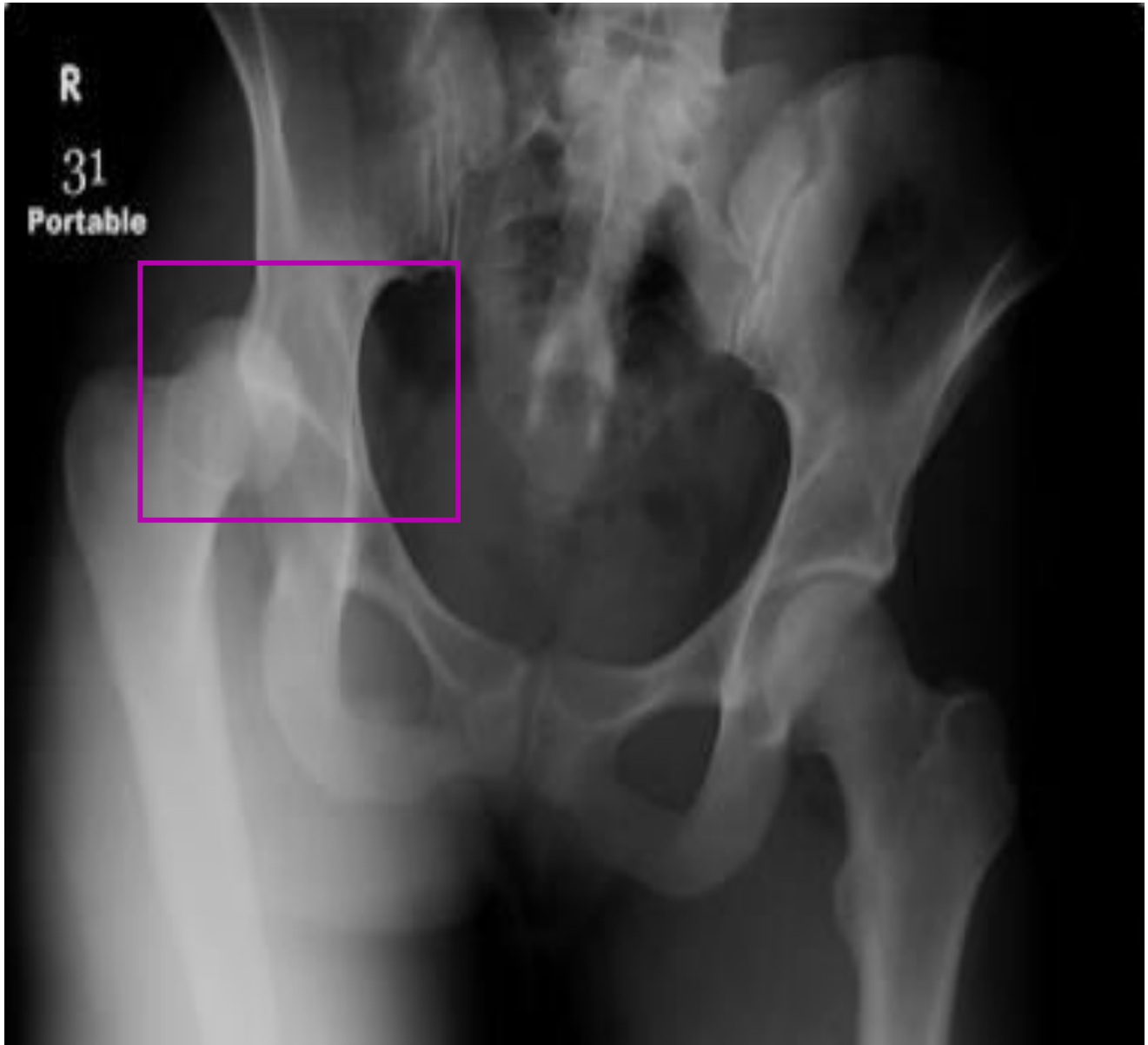
(Left Hip, Posterior Dislocation)



Left Femoral head dislocation Posteriorly



What is nerve that is commonly injured according to the pic ? **Sciatic nerve**



right hip joint posterior dislocation

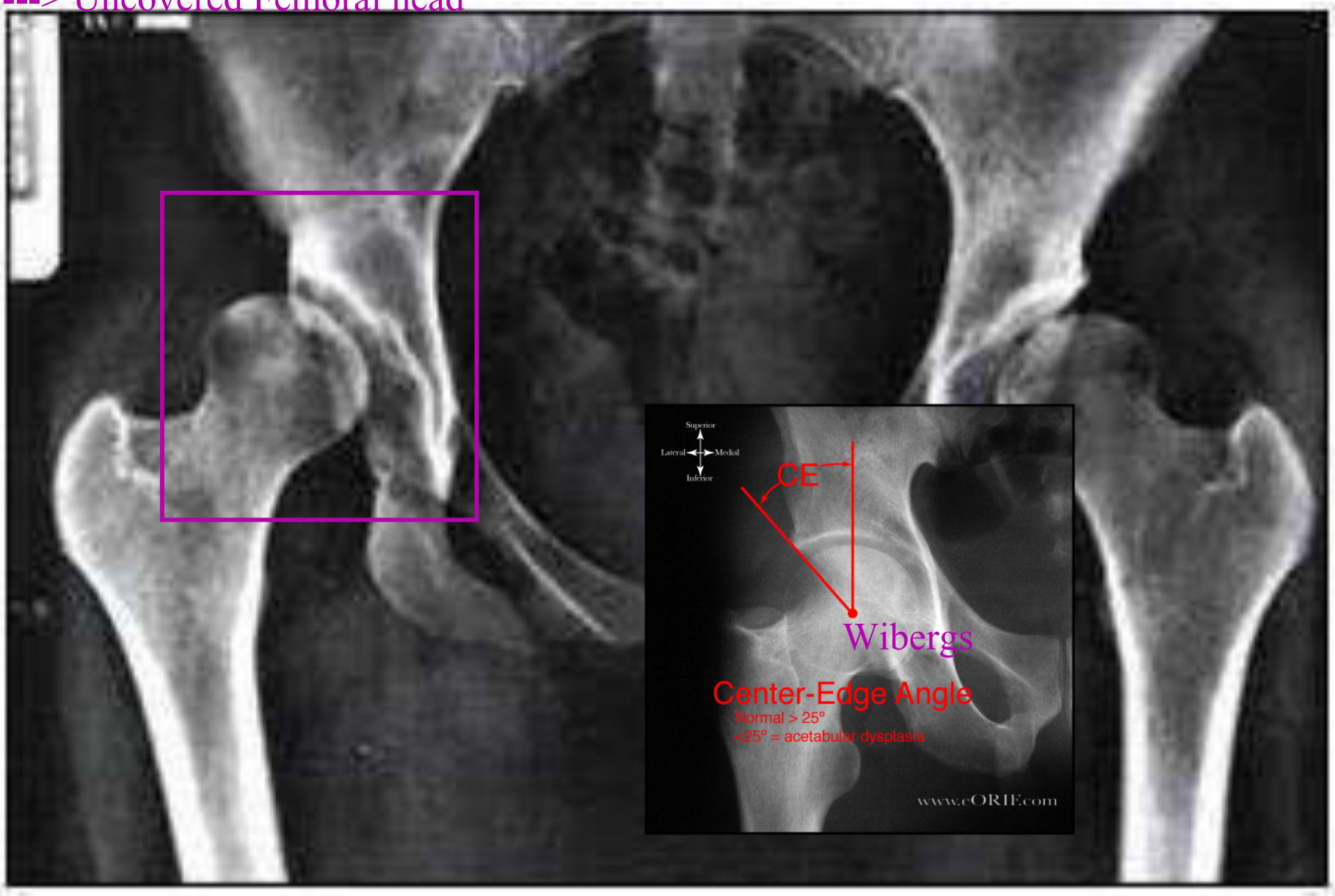
Dx? Right Acetabular Dysplasia

---> Shallow Acetabulum

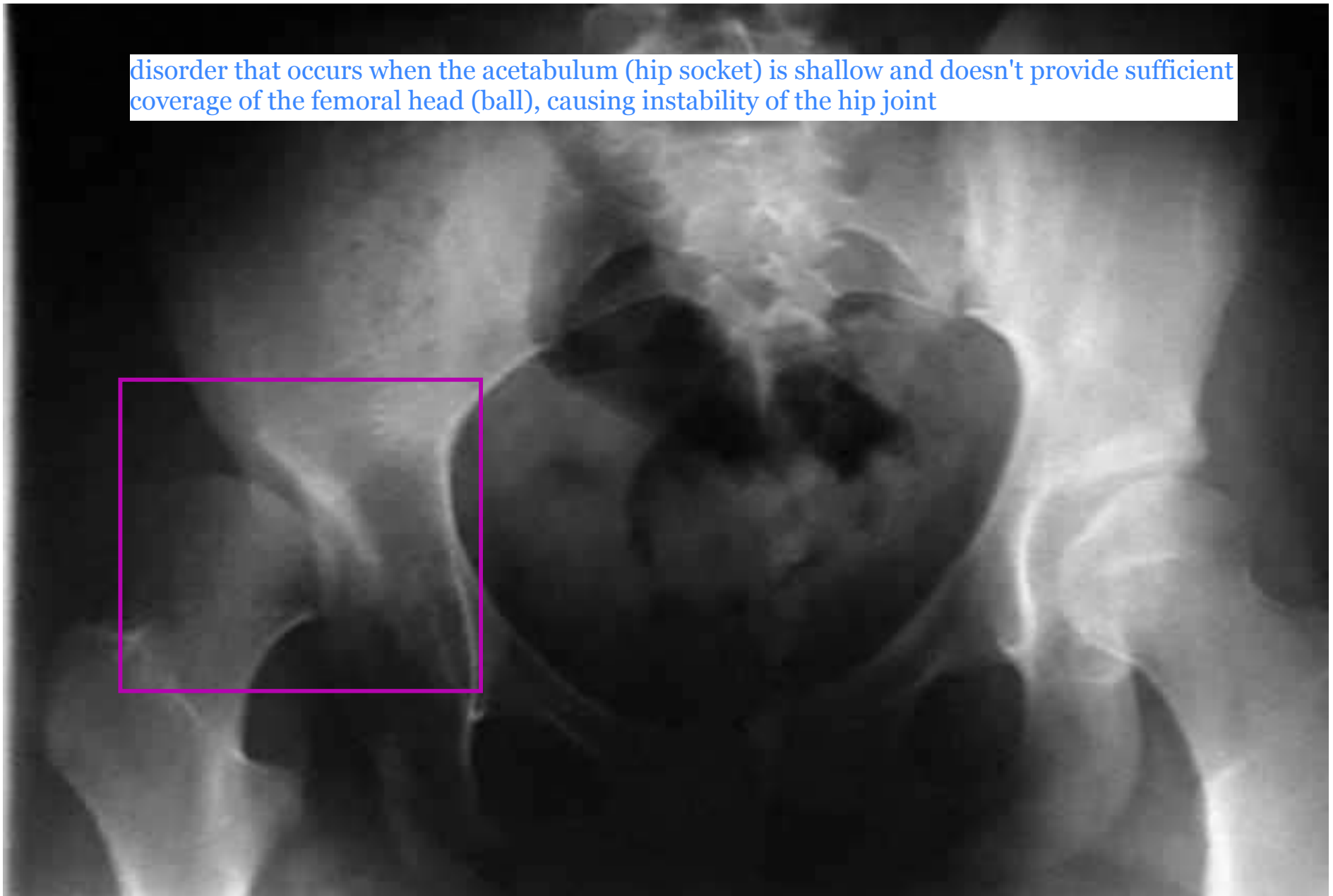
---> Sloping acetabular roof

---> Uncovered Femoral head

---> Disturbance in Shenton's Line



Dx? Acetabular Dysplasia



Dx? Hip Subluxation

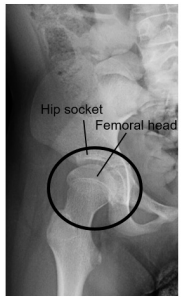
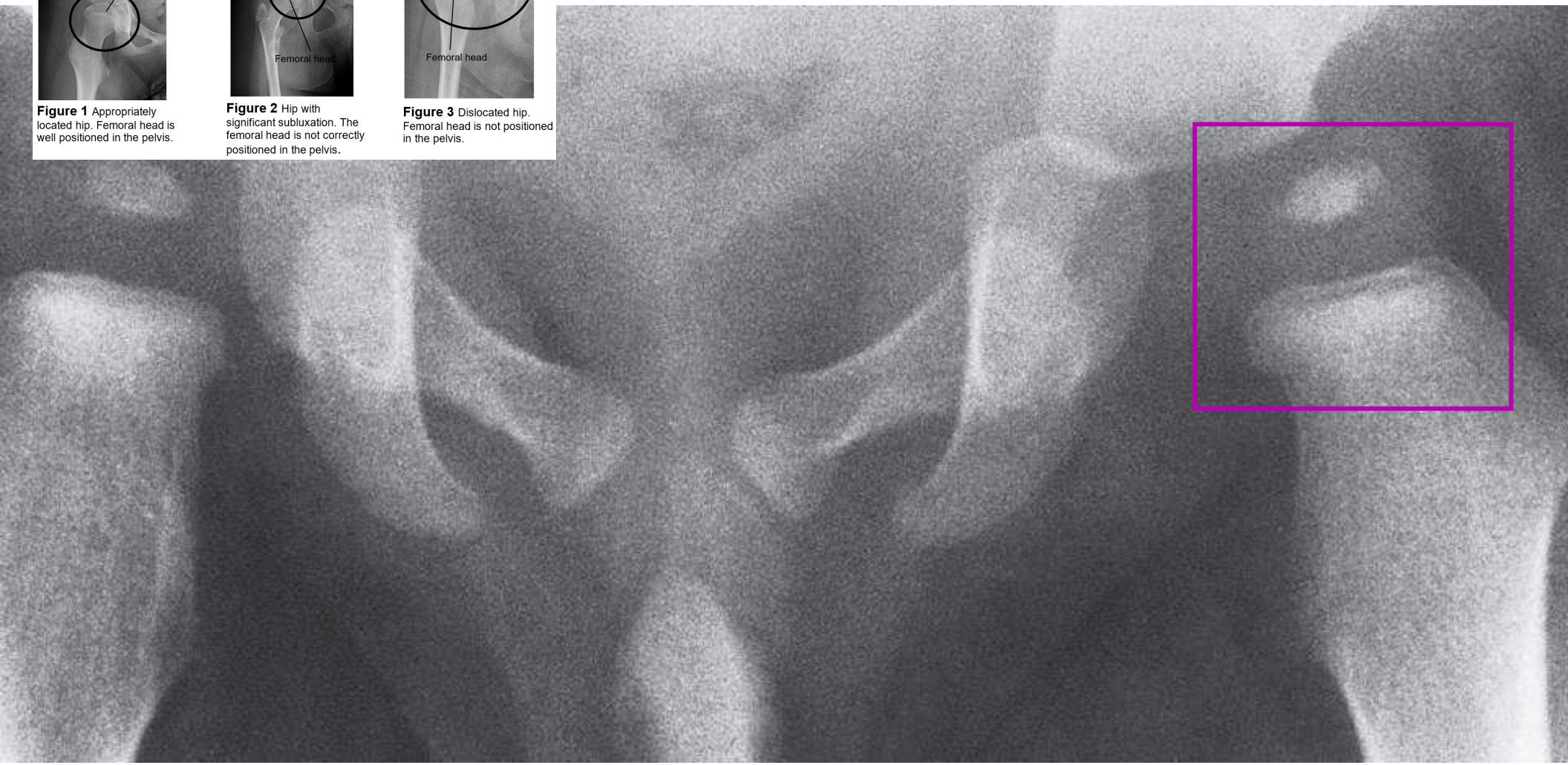


Figure 1 Appropriately located hip. Femoral head is well positioned in the pelvis.

Figure 2 Hip with significant subluxation. The femoral head is not correctly positioned in the pelvis.

Figure 3 Dislocated hip. Femoral head is not positioned in the pelvis.



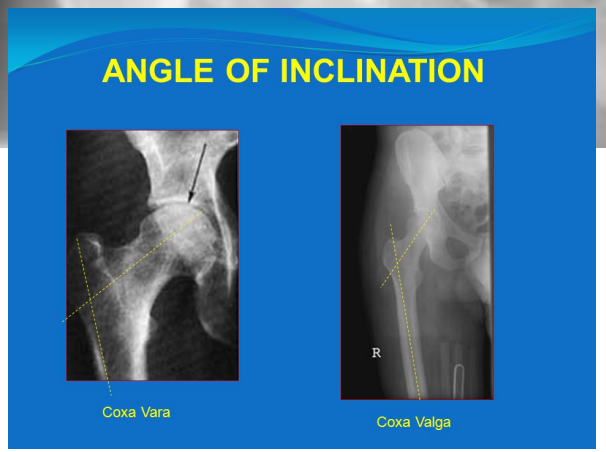
Femoral - neck - shaft - Angle

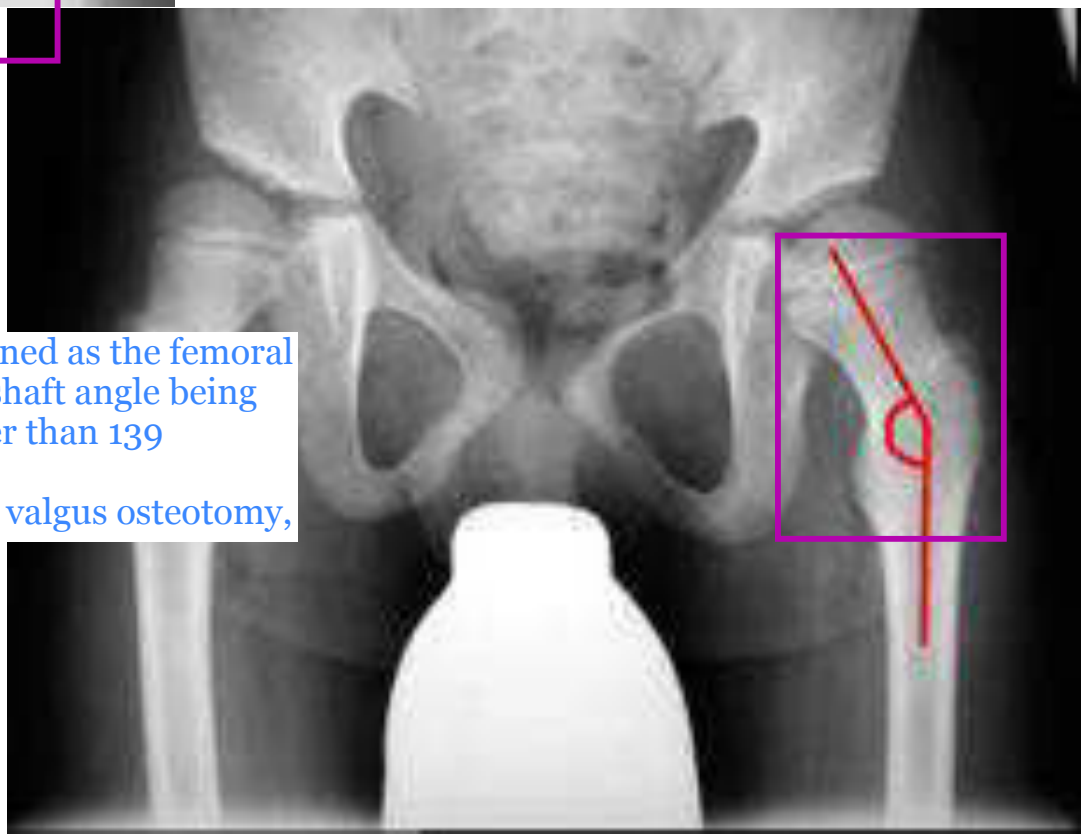
vara → normal → valga

Developmental Coxa Vara is a rare condition that causes a decreased neck-shaft angle that is associated with an ossification defect in inferior femoral neck.

Treatment can be nonoperative or surgical corrective

Coxa Vara

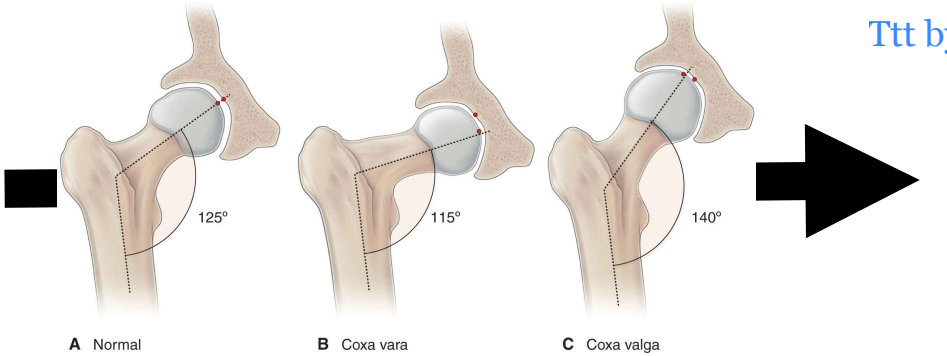




Coxa Valga

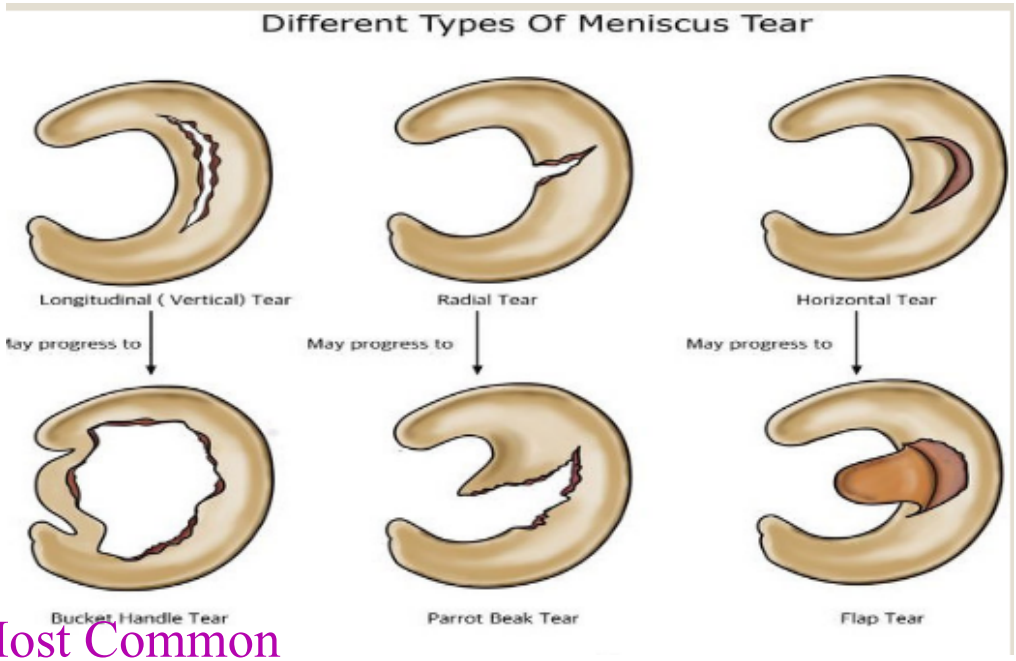
is defined as the femoral neck shaft angle being greater than 139

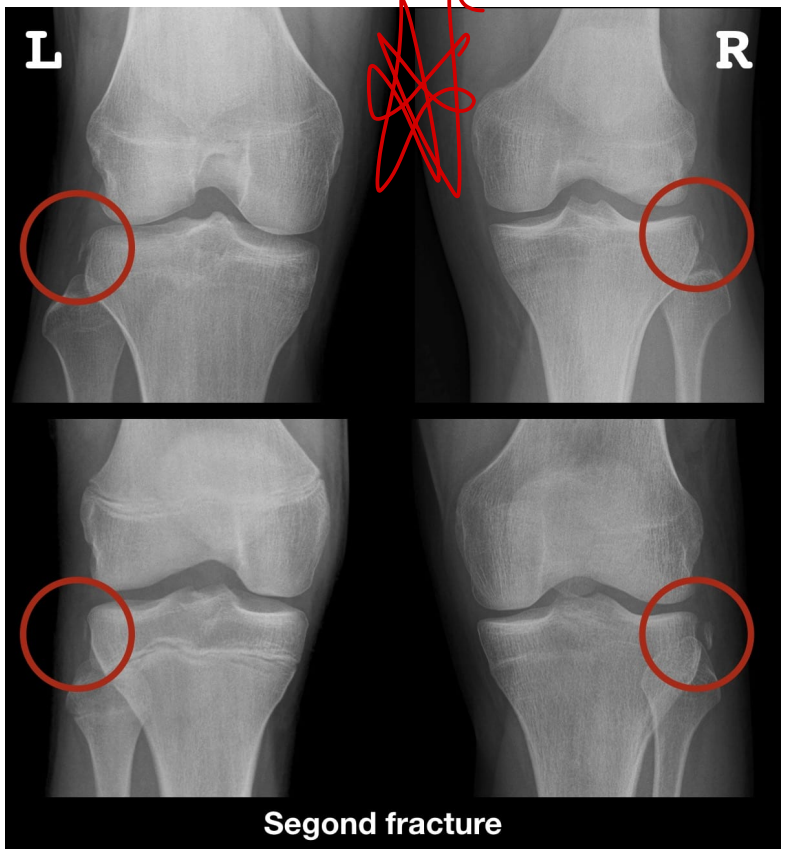
Ttt by valgus osteotomy,



Knee Disorders :

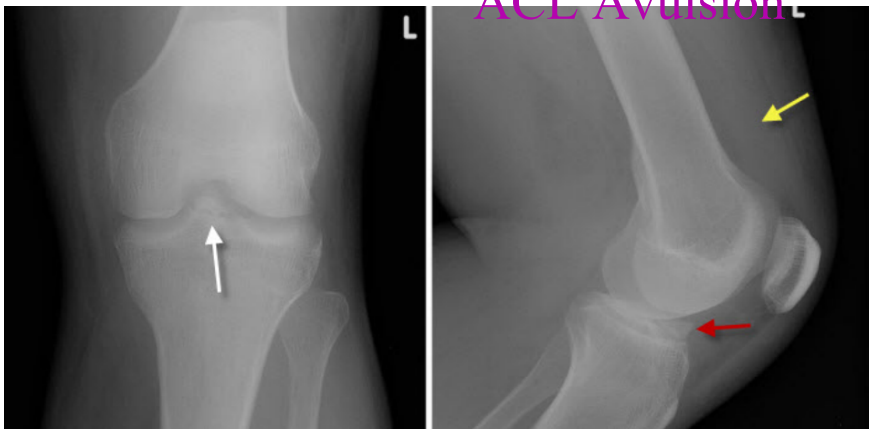
- Indicates ACL Injury anterior cruciate ligament





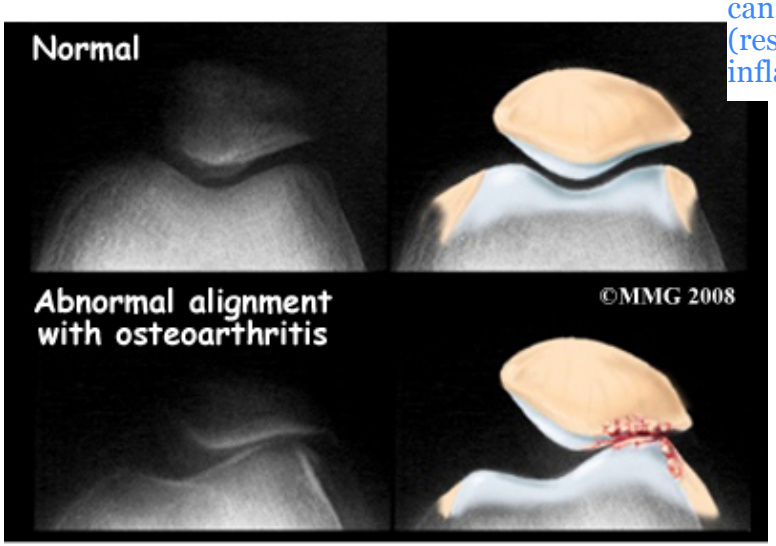
Most Common due to the normal direction of the meniscus fibers

ACL Avulsion



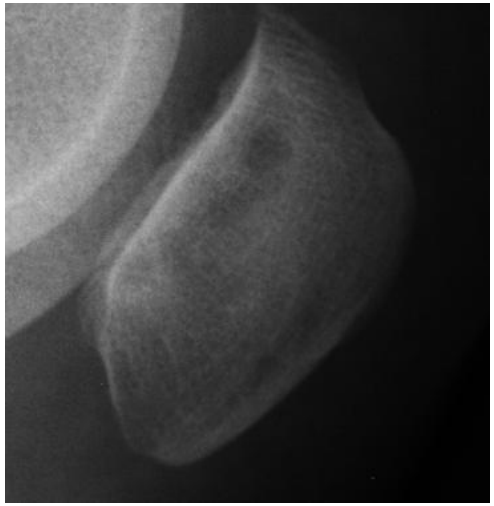
Bucket handle tear in the medial meniscus

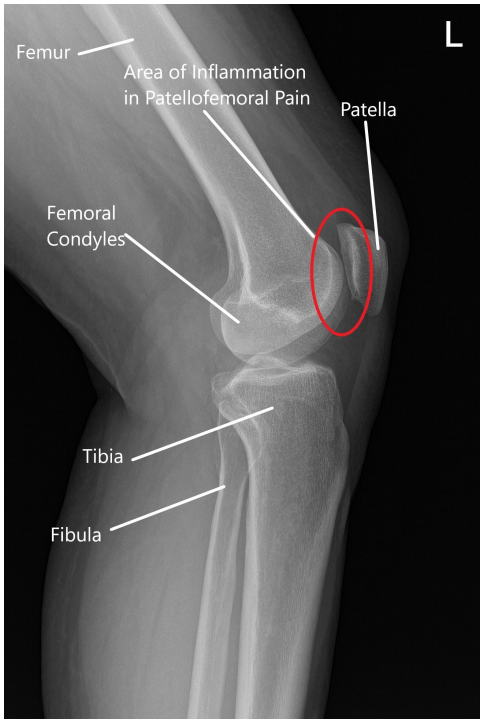
15 y old female patient presented to the clinic with painful bent Rt knee, she recalls a trivial trauma to the knee about a month ago while playing football. The ROM of the Rt knee is as shown with a stable knee. The most likely finding in this patient is *
(1 Point)



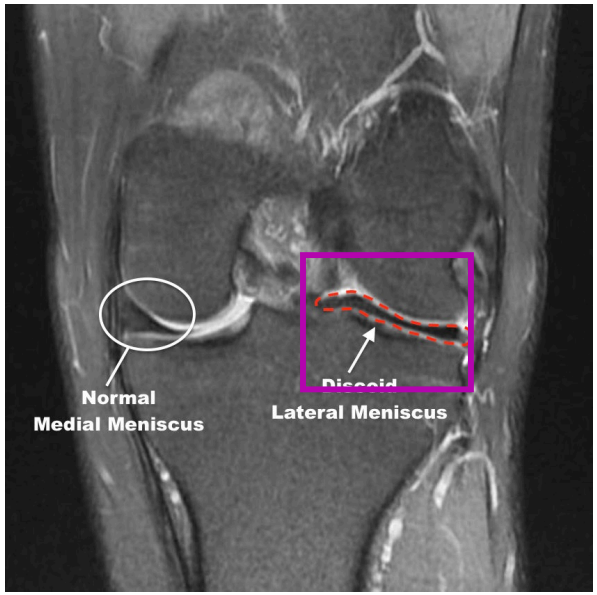
Chondromalacia patella

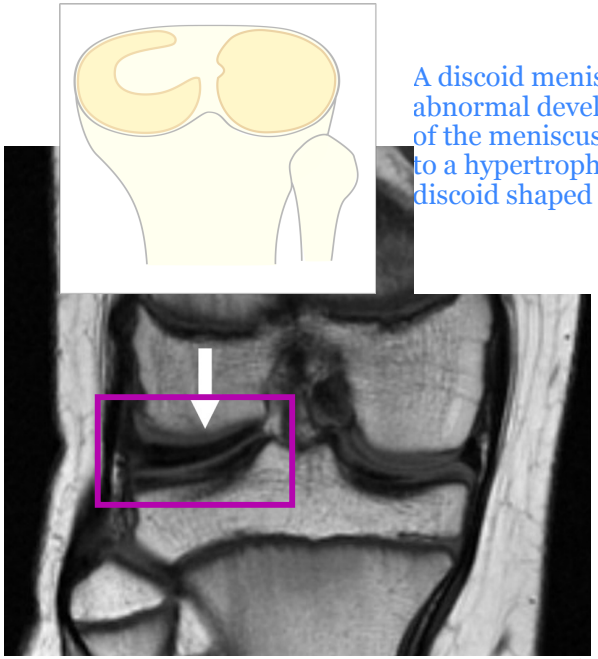
can be managed with a combination of RICE (rest, ice, compression, elevation), anti-inflammatory medications, and physiotherapy.



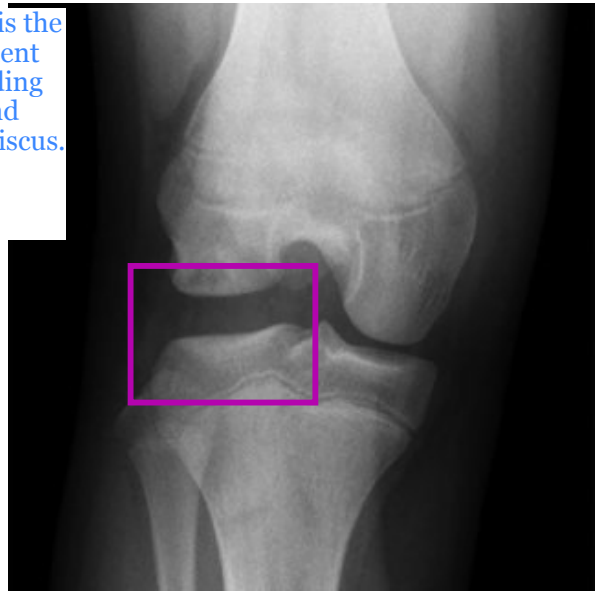


Patella Chondromalacia





A discoid meniscus is the abnormal development of the meniscus leading to a hypertrophic and discoid shaped meniscus.



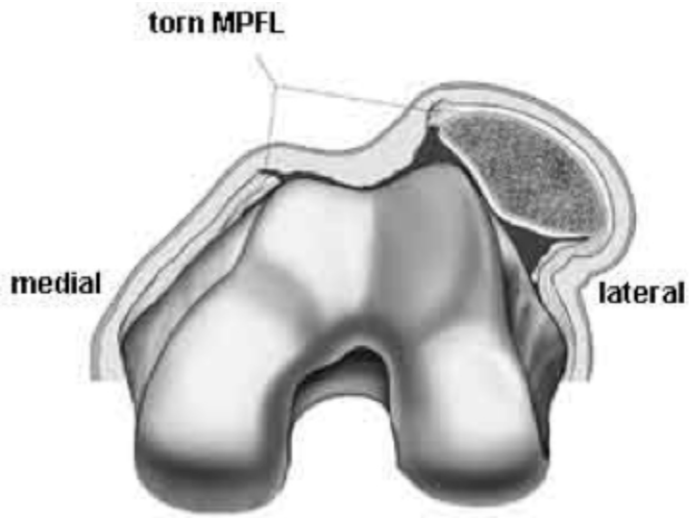
Discoid Meniscus

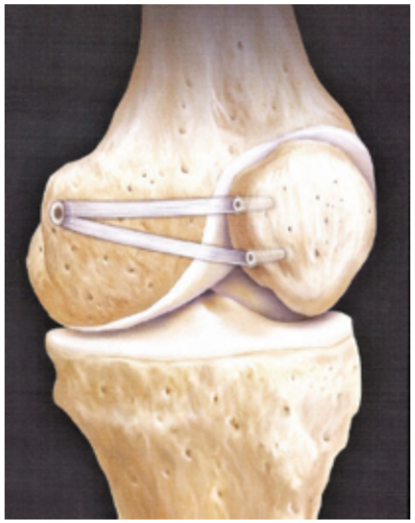
Widening in the joint space and flattening of the femoral condyles

Lateral Patellar Dislocation

Knee Sunrise view

----> Could cause injury to medial patellofemoral ligament

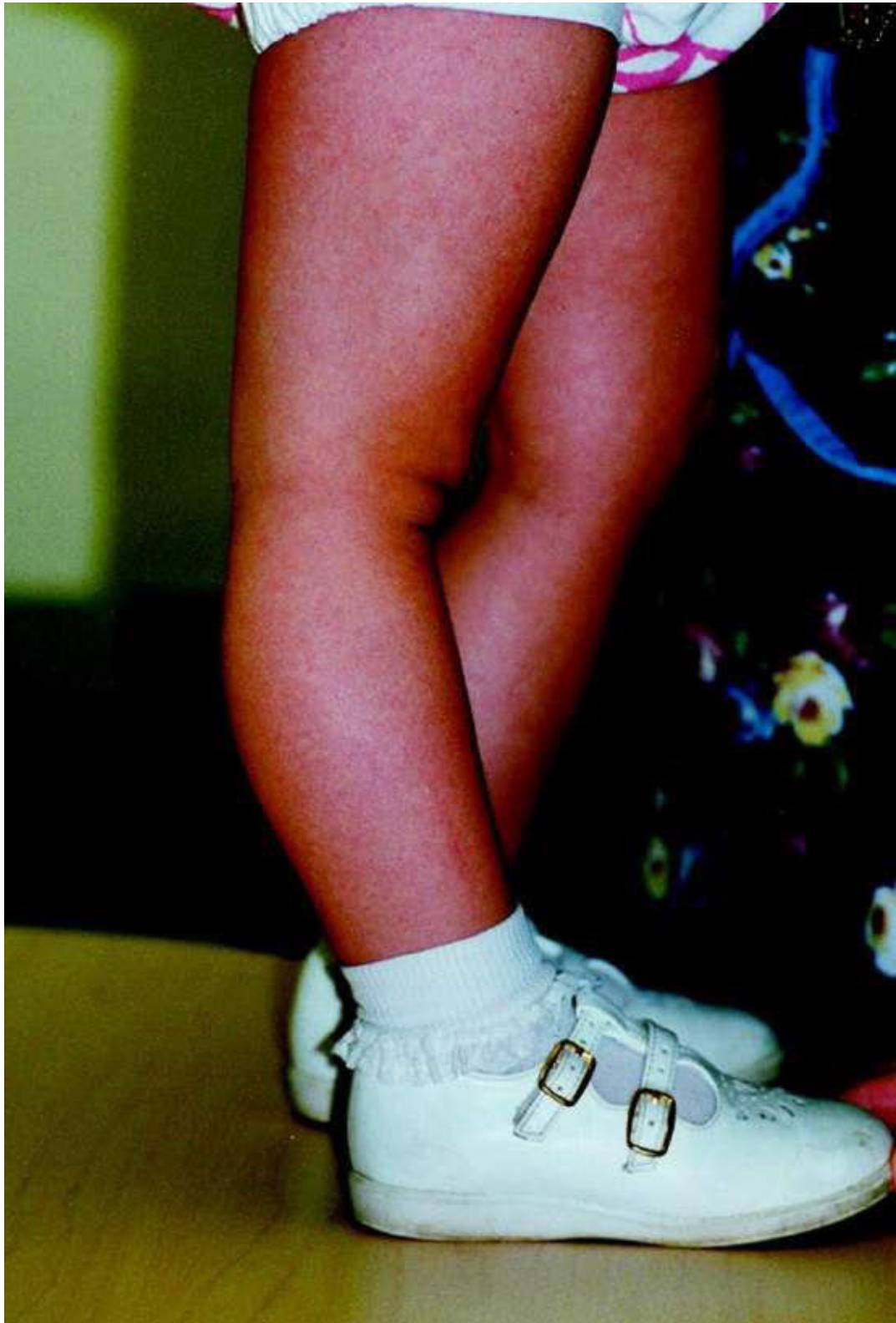




Dx?

Genu Recrovatum

Generalized Joint Laxity



Dx?

Genu Recurvatum

Dx?

Genu Valgum

“Knock-Knee”

Dx?

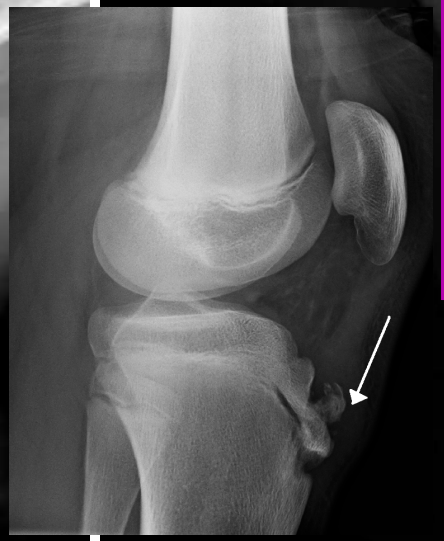
Genu Varus

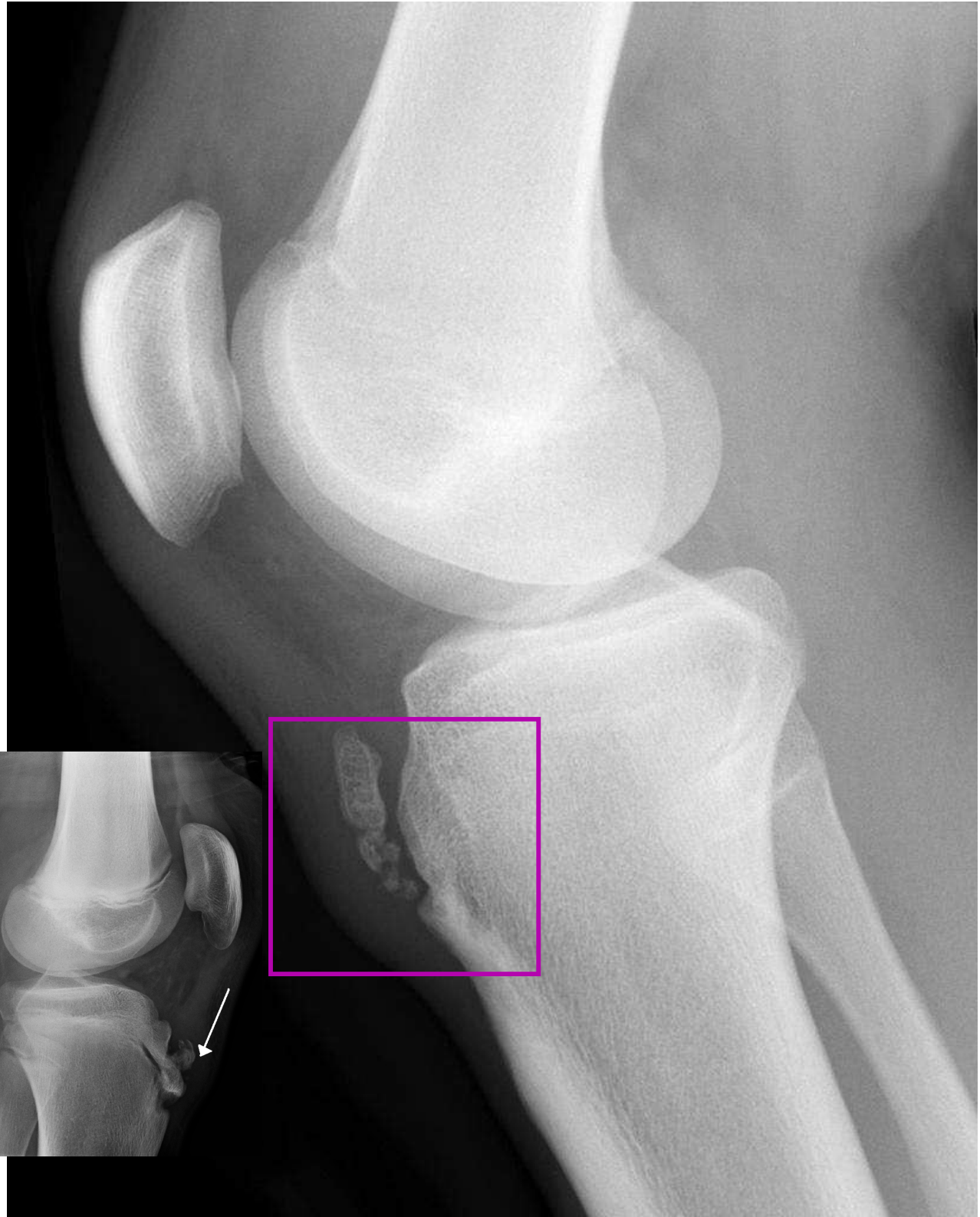
“Bow-legged”

Dx?

Osgood-Schlatter Disease (OSD)

(apophysitis of the tibial tubercle)

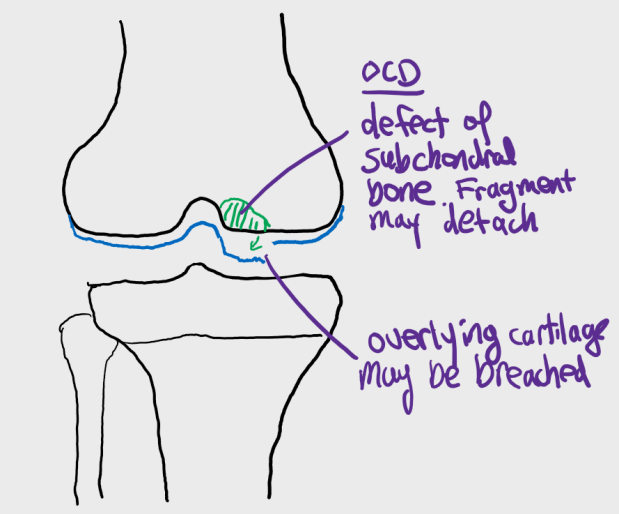




Dx?

loose tends to slip away during palpation (named a ‘joint mouse")

Loose body in the knee

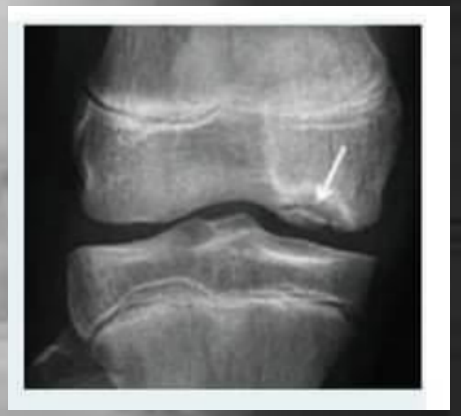


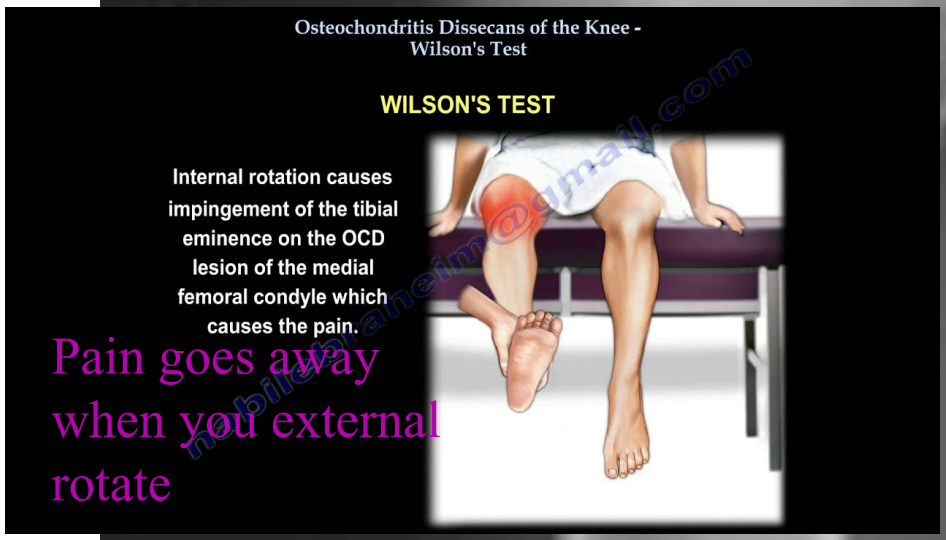
pathologic lesion affecting articular cartilage and subchondral bone

Osteochondritis dissecans

(OCD or OD)

A small, well- demarcated, avascular fragment of bone and overlying cartilage sometimes separates from one of the femoral condyles and later appears as a loose body in the joint





Pain goes away when you external rotate

Dx?

The indication for Knee arthroplasty is Severe pain

OA of the knee

Typical changes seen in OA:

- Joint space narrowing
- Subchondral Sclerosis
- Cyst formation
- Osteophytes

---> Most of the time there will be genu Varus

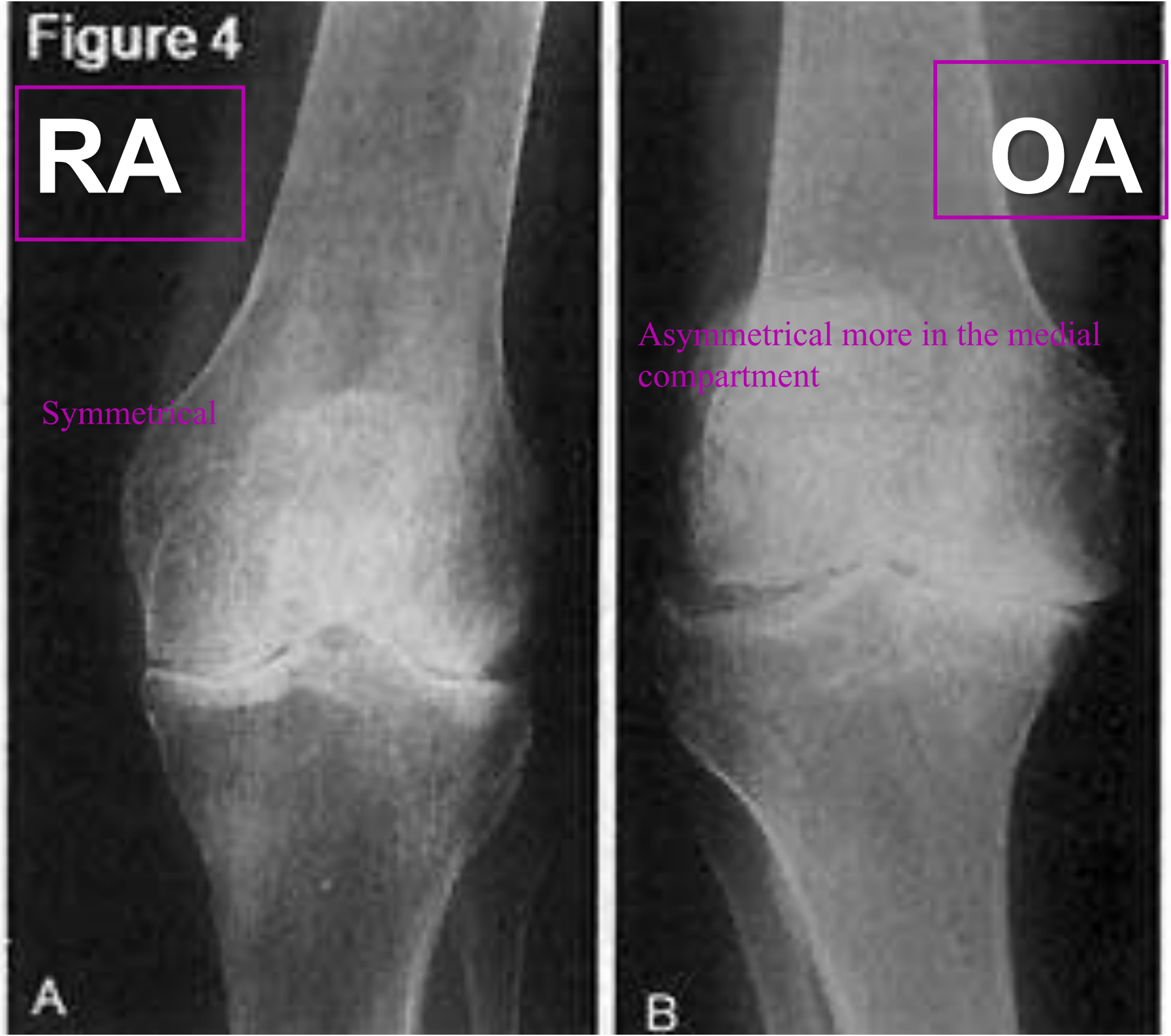
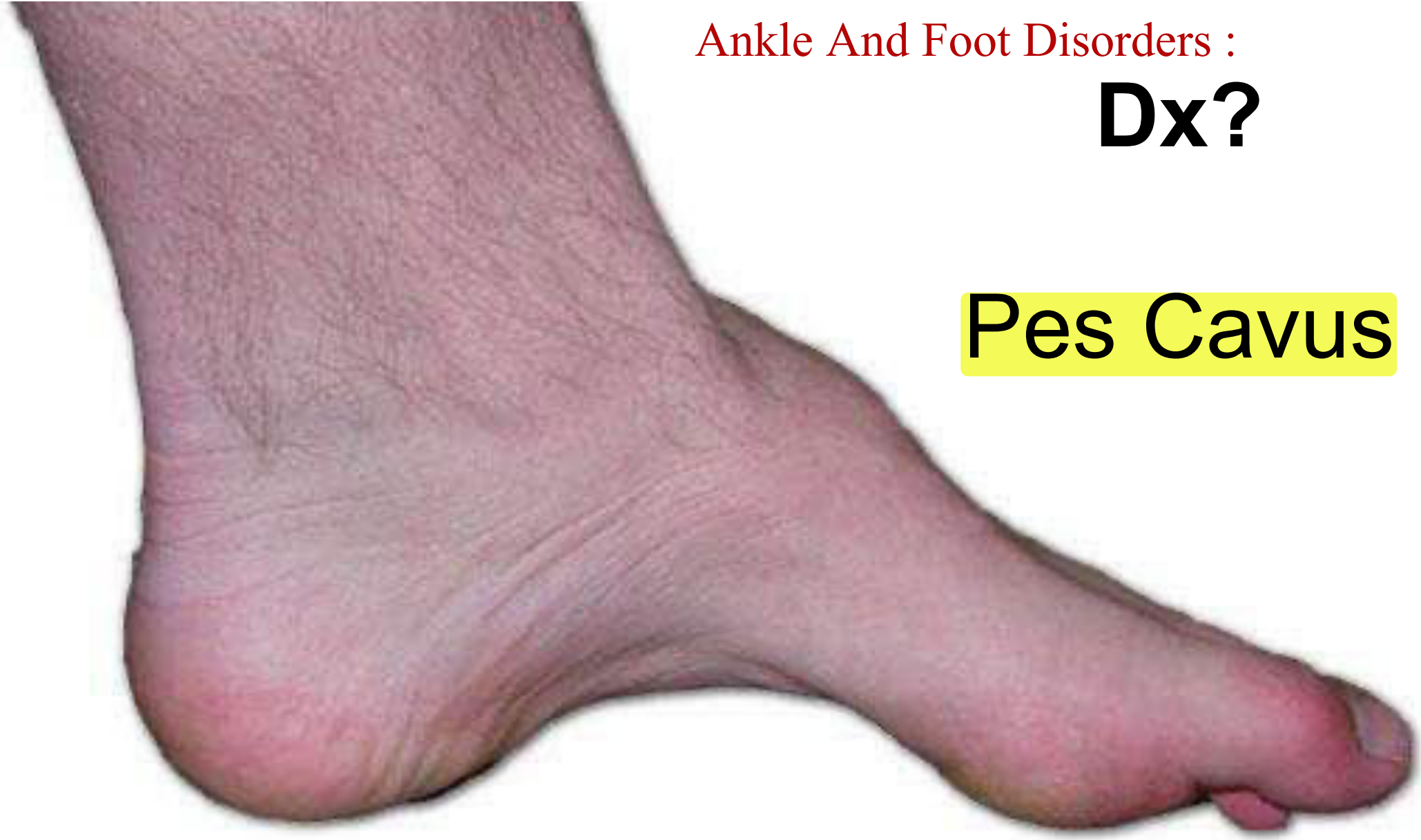


Figure 4
RA
OA
Symmetrical
Asymmetrical more in the medial compartment
A
B

Ankle And Foot Disorders :

Dx?



Pes Cavus

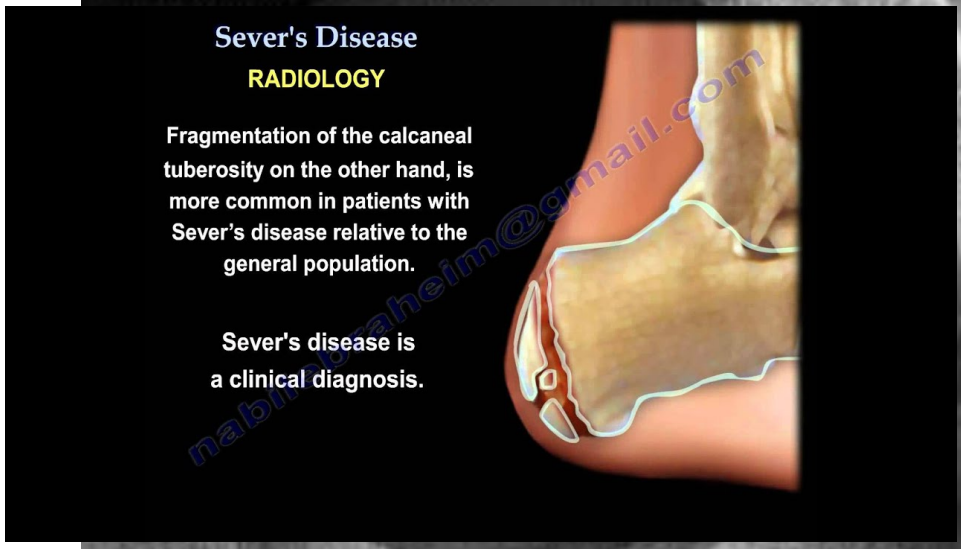
Dx?

Pes Planus Valgus

Dx?

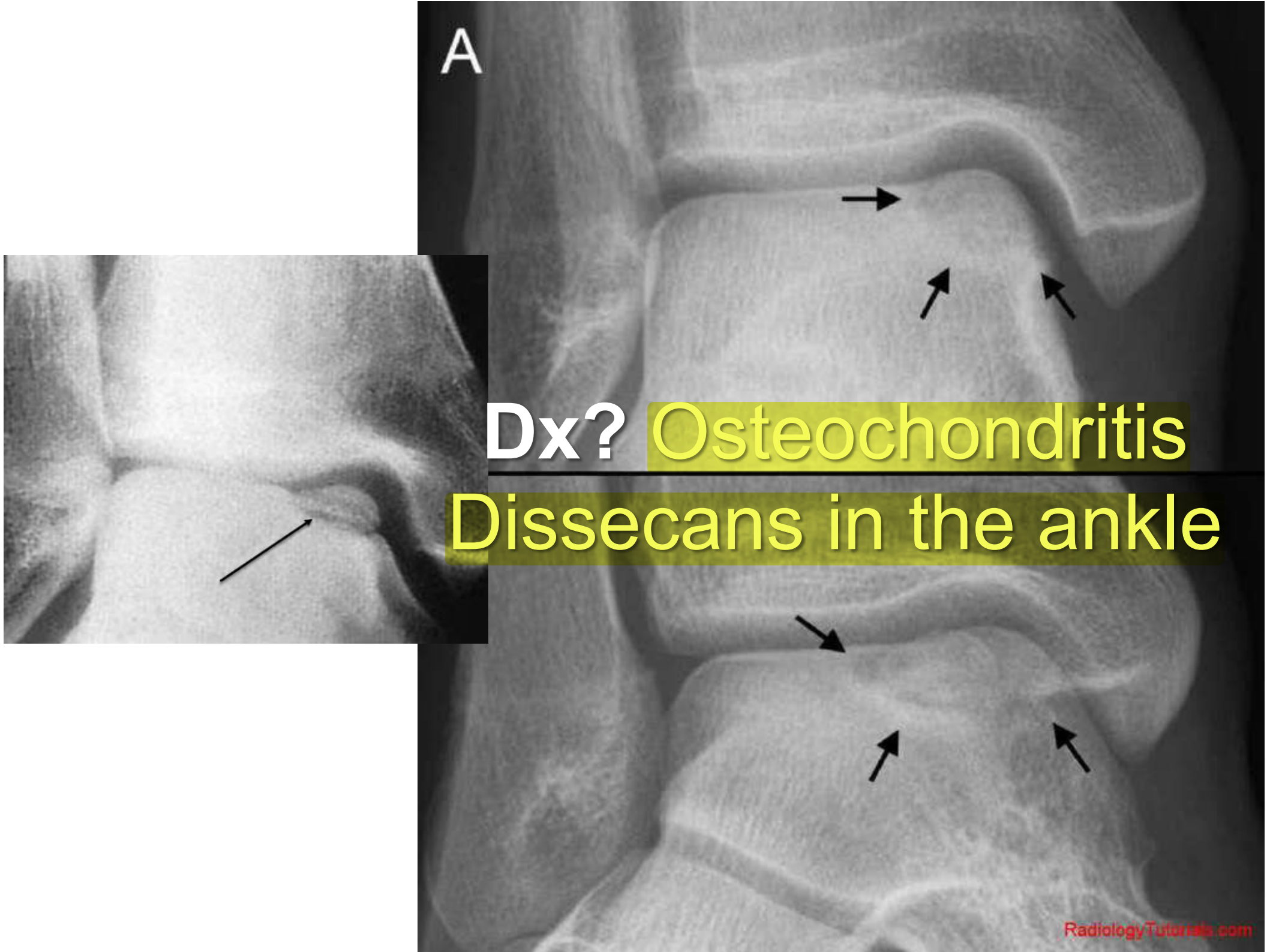
Hallucus Valgus

Dx?



Sever Disease (Apophysitis of calcaneus)

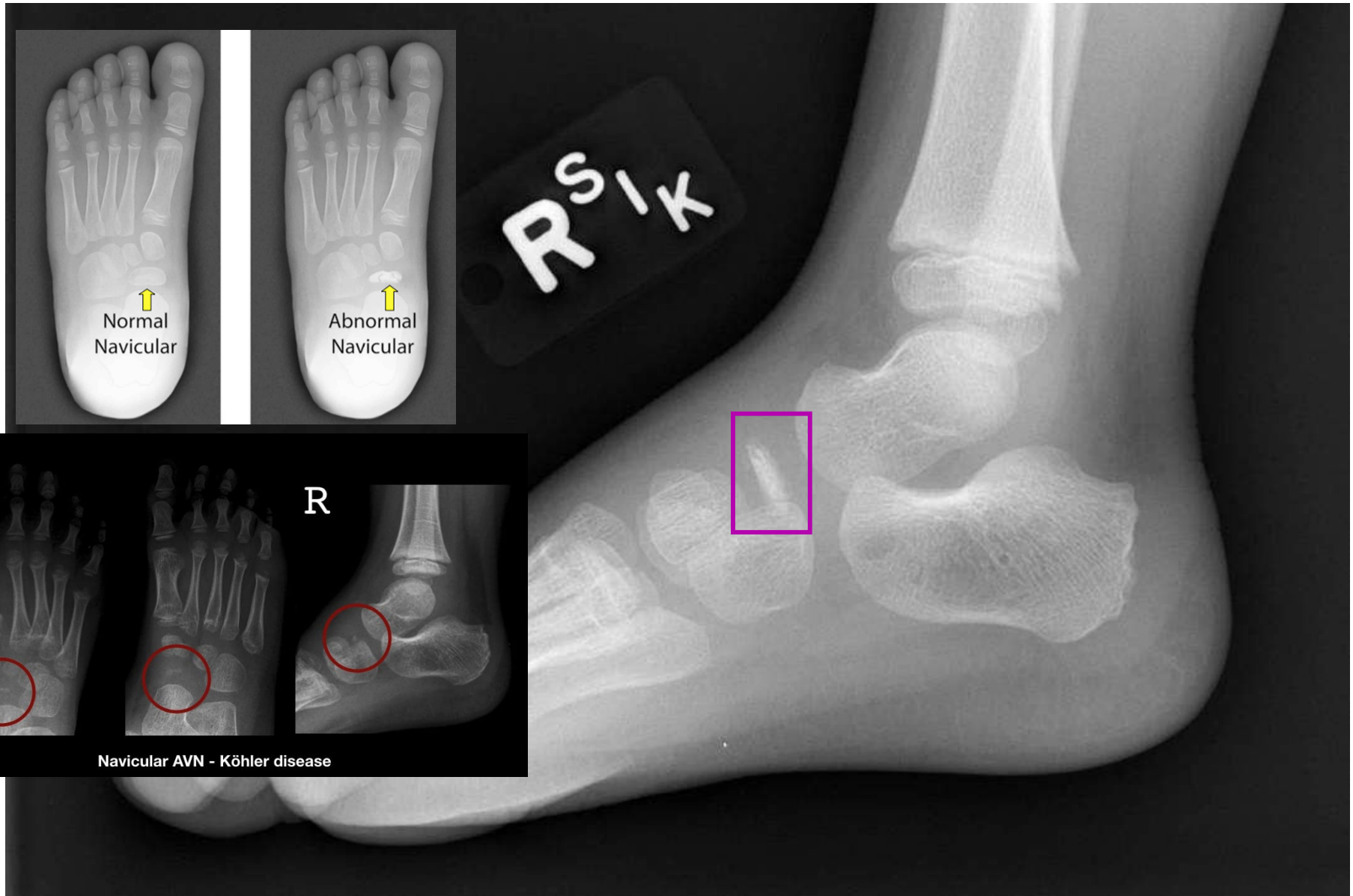
Sever's disease is the most common cause of heel pain in growing children, especially those who play sports or exercise regularly. Also known as calcaneal apophysitis, Sever's disease occurs when the growth plate in the back of the heel becomes inflamed and painful.


A
Dx? Osteochondritis
Dissecans in the ankle
RadiologyTutorials.com

Dx? Köhler Disease

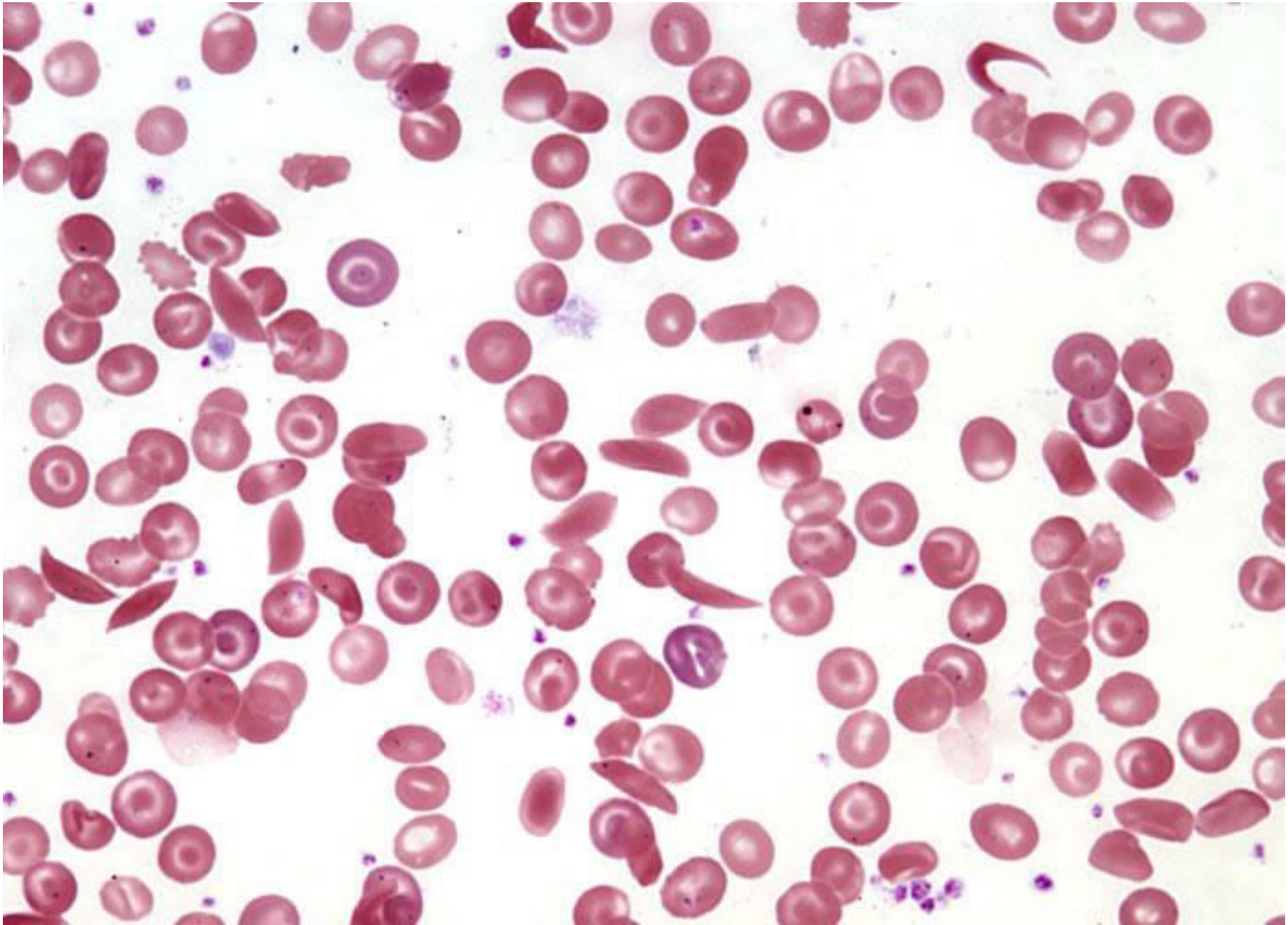
“navicular bone osteochondritis”

Navicular AVN



Bone Disorders :

- **What is most common pathogen to cause osteomyelitis in sickle cell patients?** Salmonella



--- A three year old with limbing and thigh pain for the last 24 hours , on examination he is lethargic and holding his left hip flexed and externally rotated , the most likely diagnosis :

Septic Arthritis (Septic Hip)

Considered a surgical emergency and requires prompt recognition and urgent surgical I&D followed by IV antibiotics.

TX : - Admission - Emergency incision and drainage - Joint aspiration / CT / US - Culture

History : Mostly previous upper respiratory tract infection , inability to walk

TABLE 4. Kocher Criteria for Septic Arthritis of the Hip (8)

Temperature >101.3°F (38.5°C)
White blood cell count >12,000/μL (12×10^9/L)
Erythrocyte sedimentation rate >40 mm/h
Inability to ambulate
*C-reactive protein >2.5 mg/L (23.81 nmol/L)

*C-reactive protein added by Caird et al; not part of the original Kocher criteria.

Kocher Criteria	No (0 points)	Yes (1 point)
Non-Weight Bearing	☐	☐
Temp > 38.5° C (101.3° F)	☐	☐
ESR > 40 mm/hr	☐	☐
WBC >12,000 cells/mm³	☐	☐

Points	Likelihood of Septic Arthritis
0	0.20%
1	3%
2	40%
3	93%
4	99%

	Age	Organisms
1	Neonates	Streptococcus sp Gram-negative organisms
2	Infants	Staphylococcus aureus Haemophilus influenza
3	Children	Staphylococcus aureus Salmonella
4	Adolescent	Staphylococcus aureus Nesseria gonorrhoea
5	Adults	Staphylococcus aureus Streptococcus Gram-negative organisms
6	IV Drug Abusers	Suspect Pseudomonas and atypical organisms

Spine Disorders

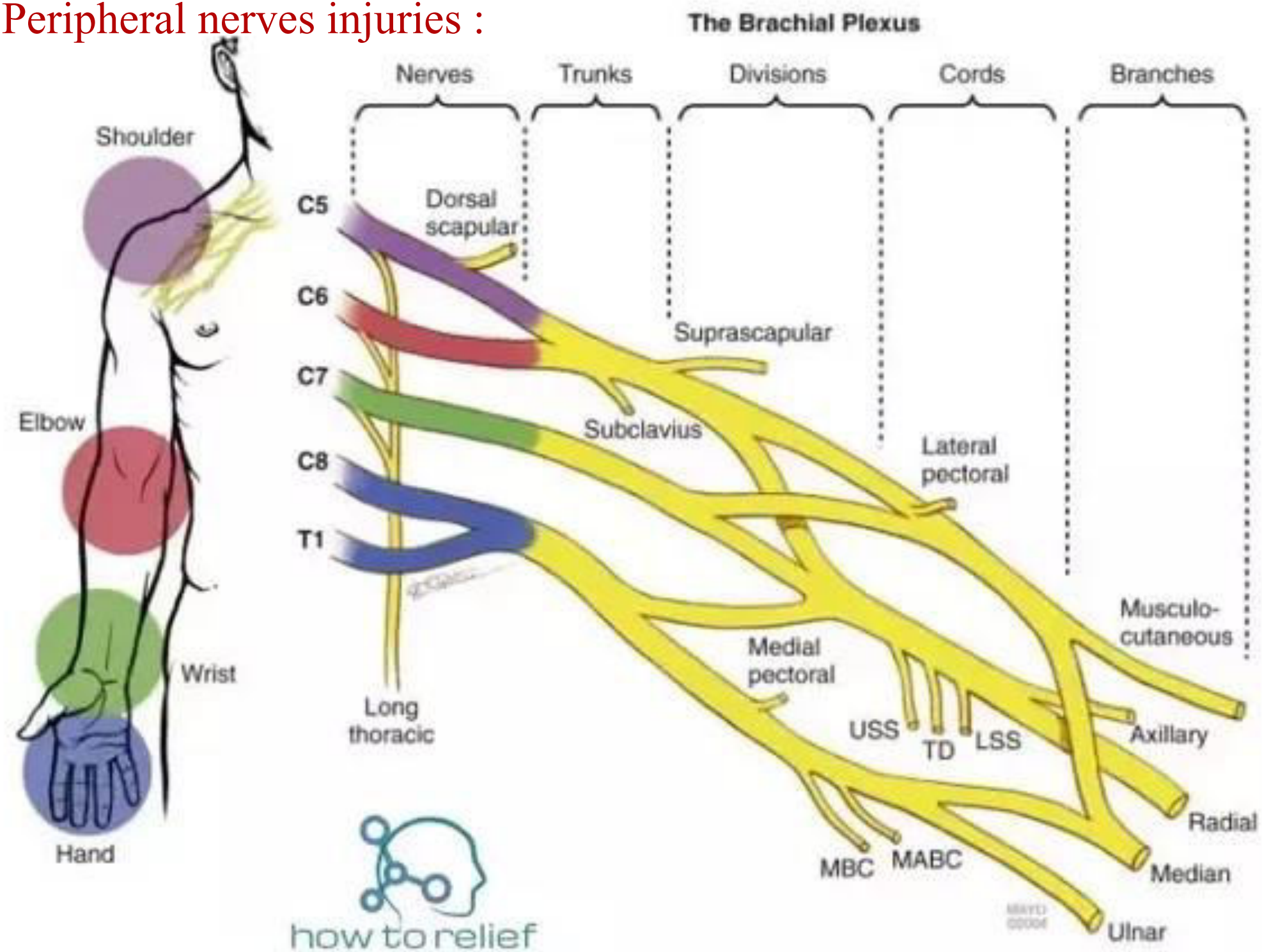
Scoliosis

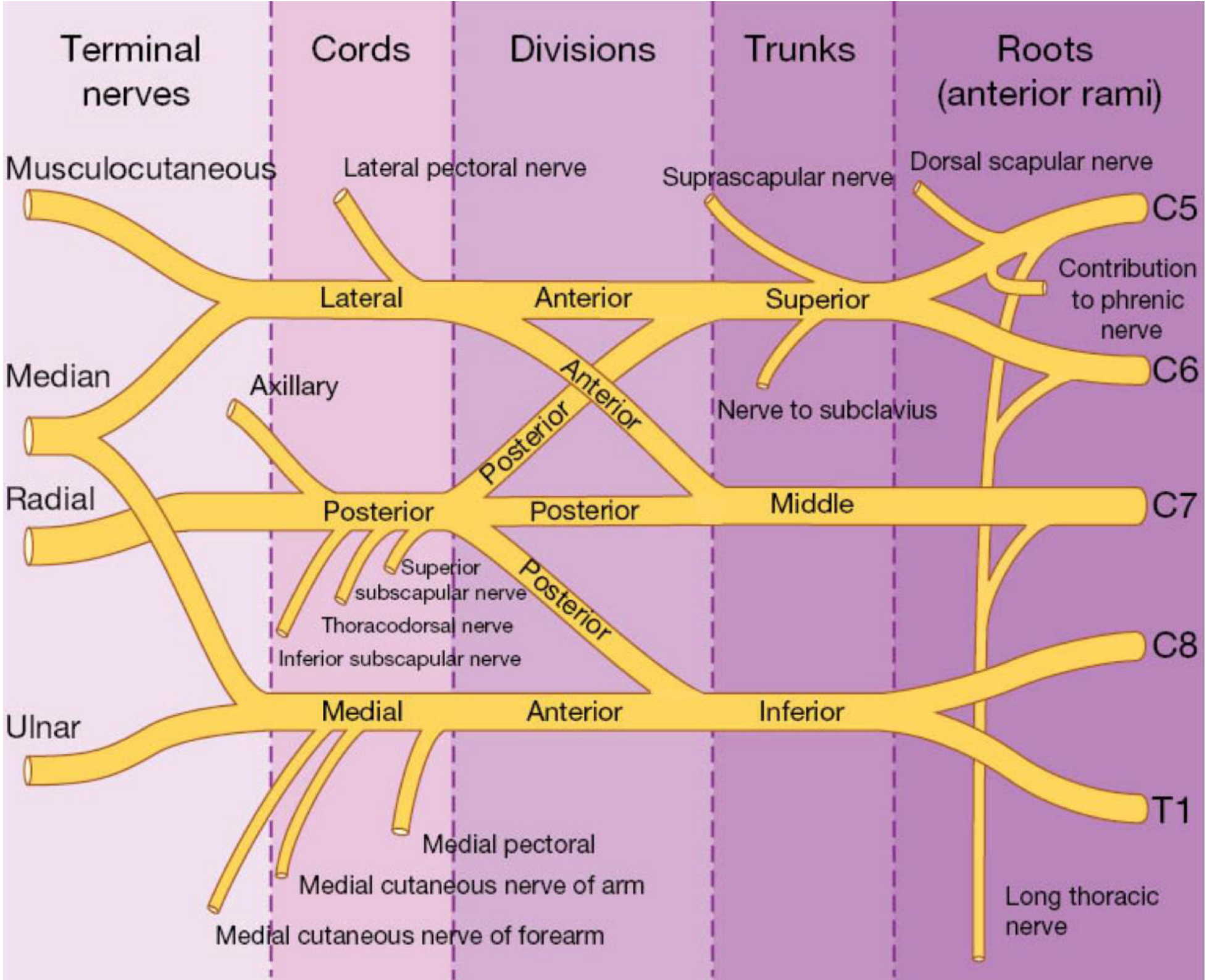
Thoracic Scoliosis

scheuermann's kyphosis
: a structural deformity of the vertebral bodies and spine. The kyphosis of the thoracic region will be around 45 to 75 degrees.

Lordosis

Peripheral nerves injuries :

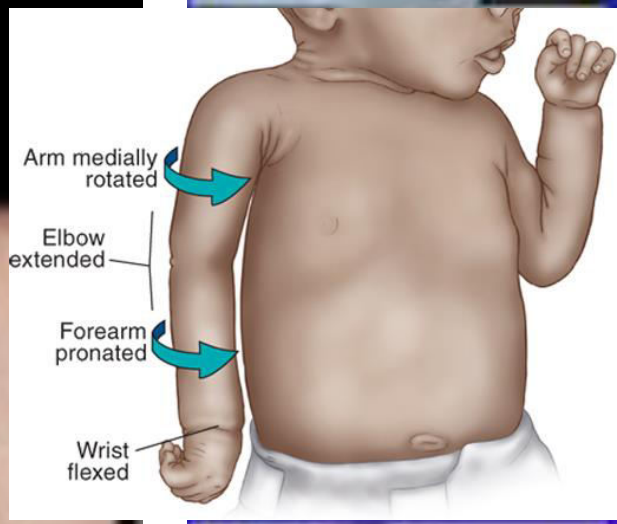


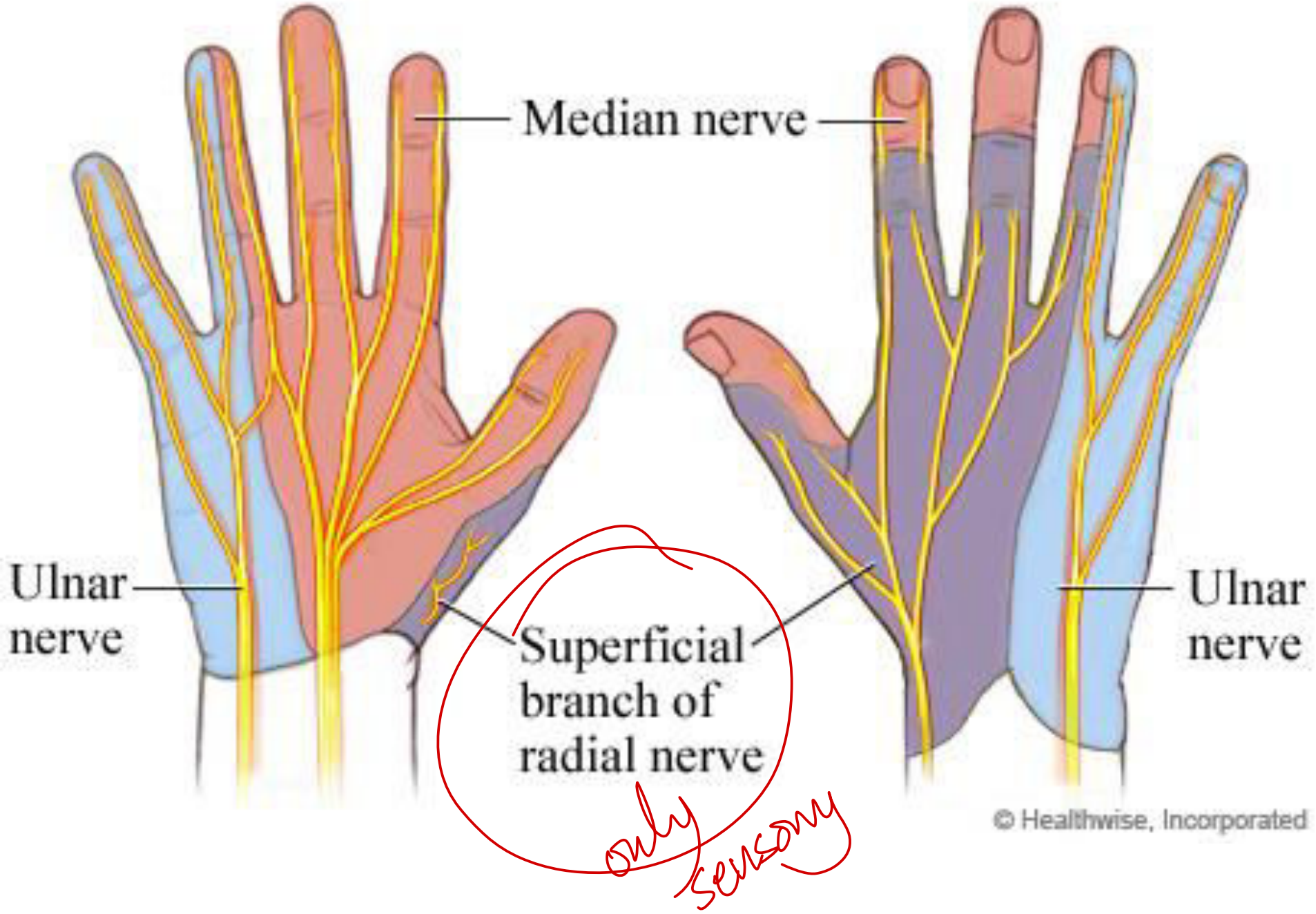

Terminal nerves
Cords
Divisions
Trunks
Roots (anterior rami)
Musculocutaneous
Lateral pectoral nerve
Suprascapular nerve
Dorsal scapular nerve
C5
Contribution to phrenic nerve
Lateral
Anterior
Superior
C6
Median
Axillary
Anterior
Posterior
Nerve to subclavius
Radial
Posterior
Posterior
Middle
C7
Superior subscapular nerve
Thoracodorsal nerve
Inferior subscapular nerve
Posterior
C8
Ulnar
Medial
Anterior
Inferior
T1
Medial pectoral
Medial cutaneous nerve of arm
Medial cutaneous nerve of forearm
Long thoracic nerve

Erbs palsy

"causes paralysis of the abductors and external rotators of the shoulder and the forearm supinator's, The arm is held to the side, internally rotated & pronated"

Waiter Tip Position




Median nerve
Ulnar nerve
Superficial branch of radial nerve
Ulnar nerve
only sensory
© Healthwise, Incorporated

Nerve Palsies

Ulnar

Median

Radial

Pointing finger

Claw Hand

Ape Hand

Mnemonic: DR.CUMA

Drop

Radial

Claw

Ulna

Median

Ape

- **What is the muscle responsible for this movement ?**

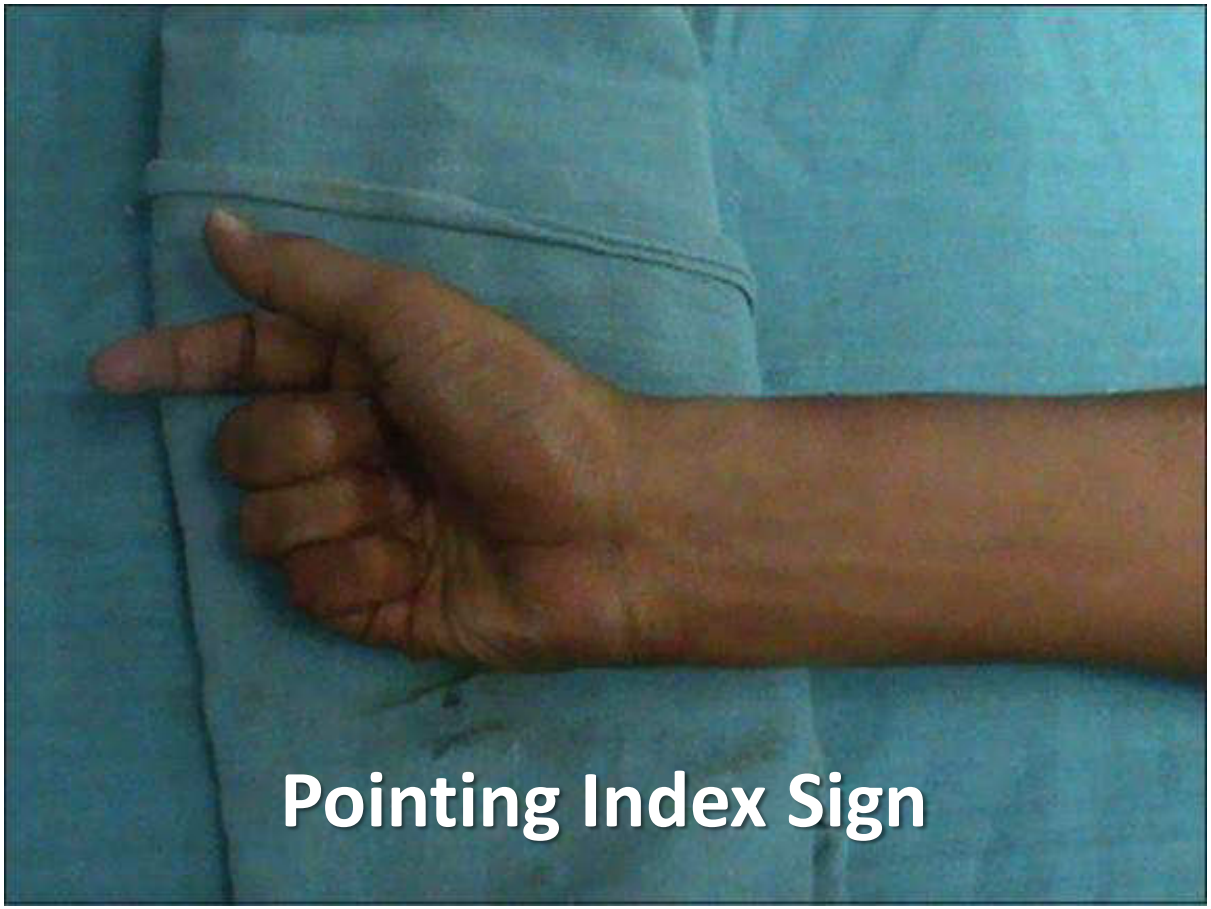
Lumbricals → 4 at the metacarpophalangeal joints

- **Supplied by which nerve ?**

by Ulnar nerve and median nerve

Cut injury at forearm result in this picture which most likely nerve injury?

Median nerve injury



60 years old presented after falling down with these findings , The patient is able to extend his elbow , what is the level of the lesion :

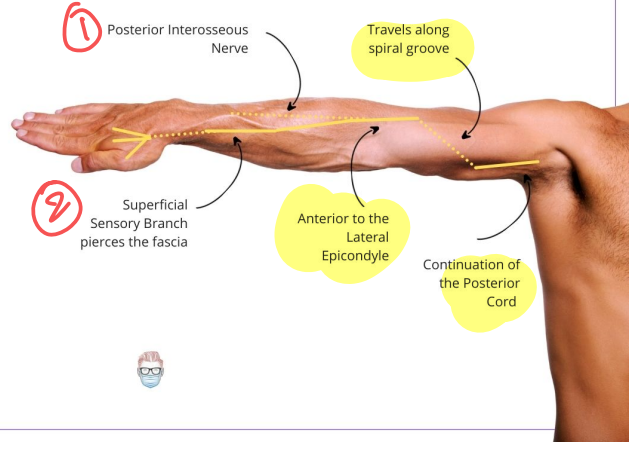
---> Lower level Radial Nerve lesion

HIGH VS LOW RADIAL NERVE PALSY

thePlasticsFella.com

	High Radial Nerve Palsy	Low Radial Nerve Palsy
Location	Proximal to Proximal Forearm	Distal to Proximal Forearm
Nerves	Radial Nerve Proper	PIN and SBRN
Elbow Extension	Absent if injury proximal to tricep branches	Present
Wrist Extension	Absent	Weak with Radial Devication
Finger Extension	Absent	Absent
Sensation	Motor and Sensory Deficits	Sensory Deficits if compression of SBRN

Anatomical Course of the Radial Nerve



27

34 y old male patient, presented to the clinic with a history of saw blade cut to his left hand, on examination the scar of the cut was over the medial aspect of the distal wrist crease. The most likely findings are: *
(1 Point)

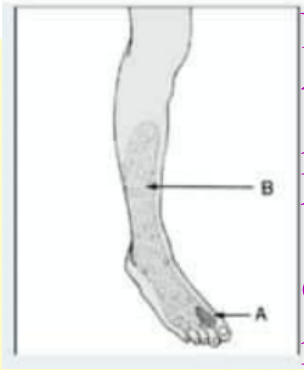
Ulnar nerve lesion (associated with Paresthesia and numbness over the medial one and half finger) in addition to claw hand deformity (it will be more associated with picture B -- > As the injury caused low level lesion - Ulnar paradox)

Cutaneous innervation of the foot

- Saphenous nerve ❶
- Deep peroneal nerve ❷
- Superficial peroneal nerve ❸
- Medial plantar nerve ❹
- Lateral plantar nerve ❺
- Calcaneal branch (tibial nerve) ❻
- Sural nerve ❼

Dorsal surface

Plantar surface

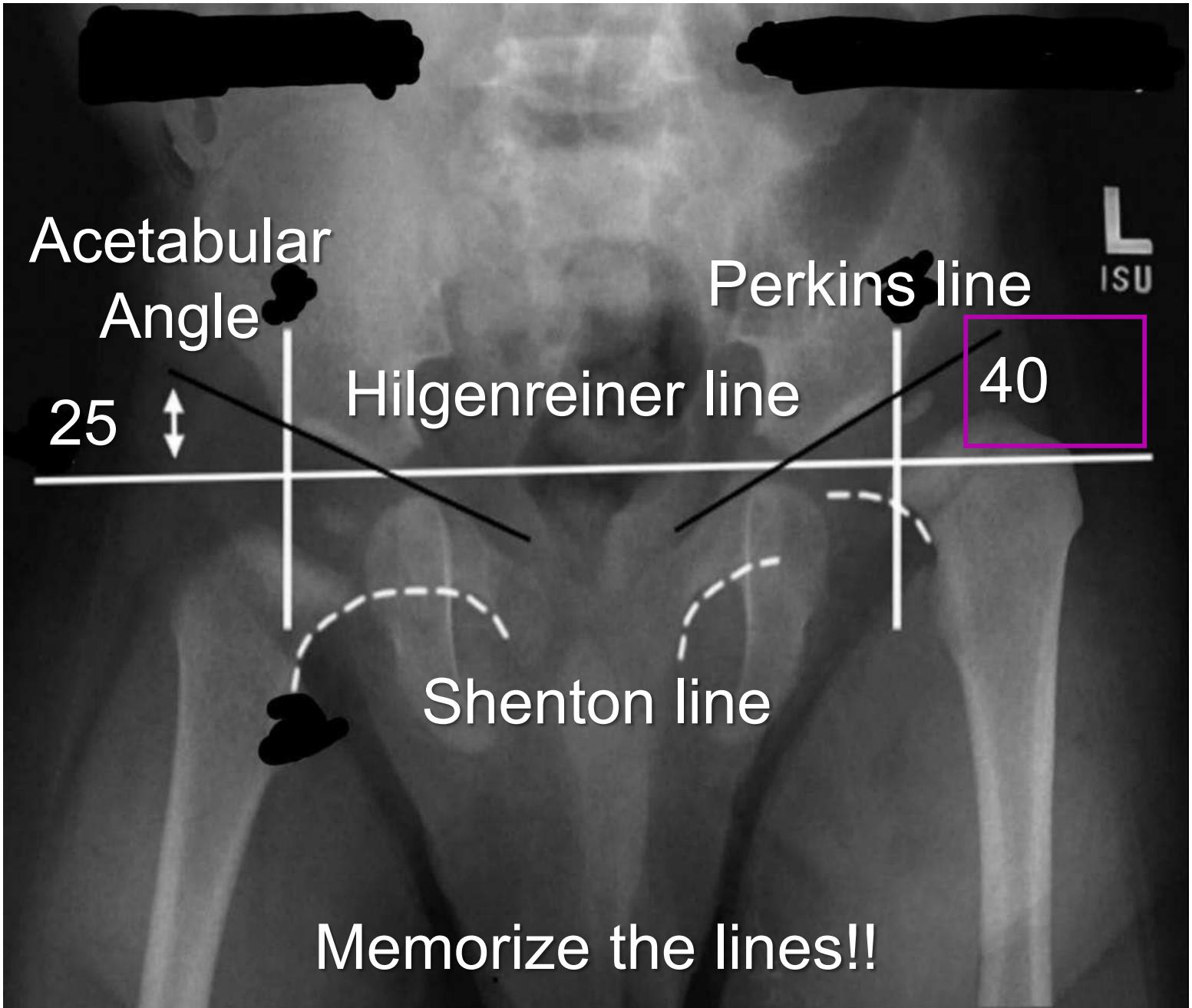


Numbness over the indicated region - caused by compression on deep peroneal nerve

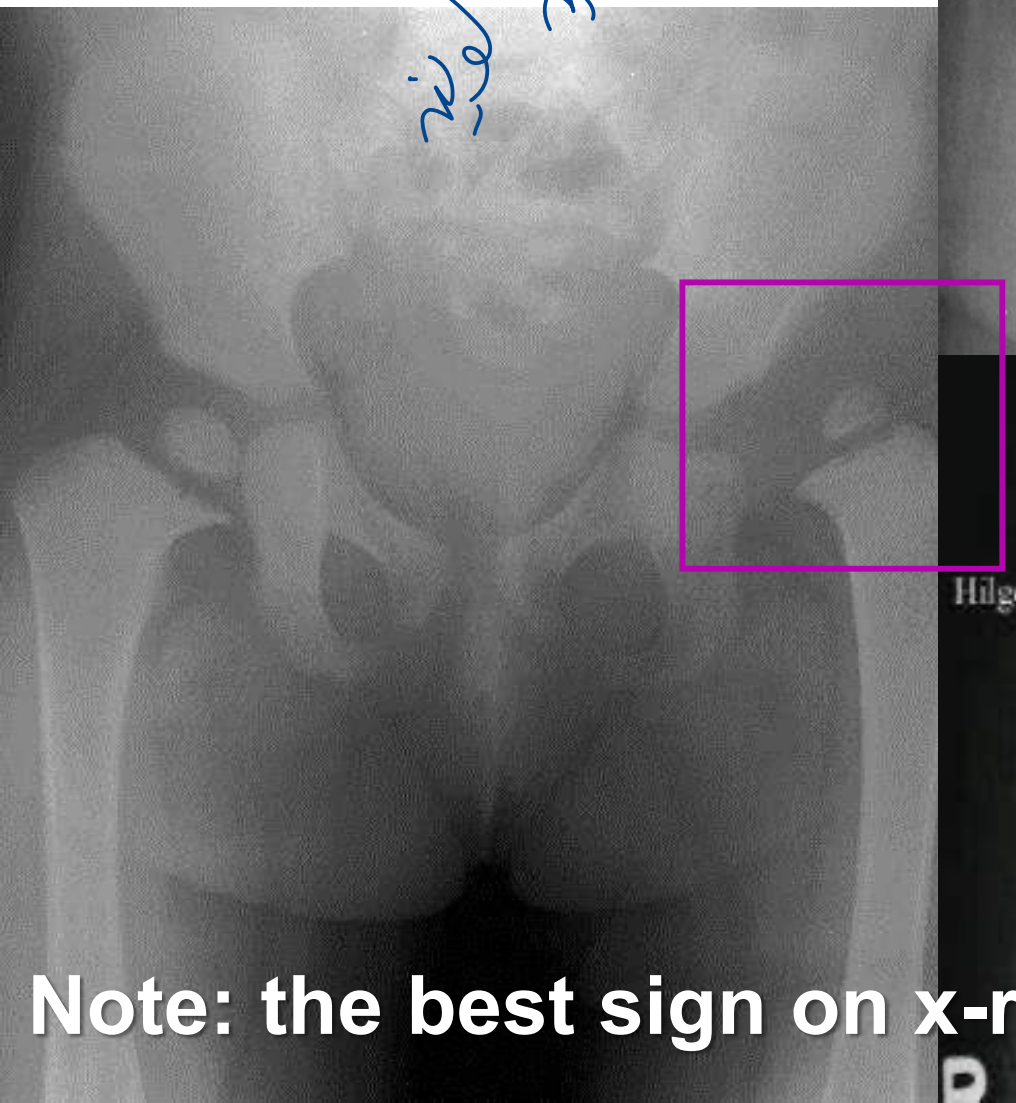
Pediatric Hip , ankle and foot disorders :

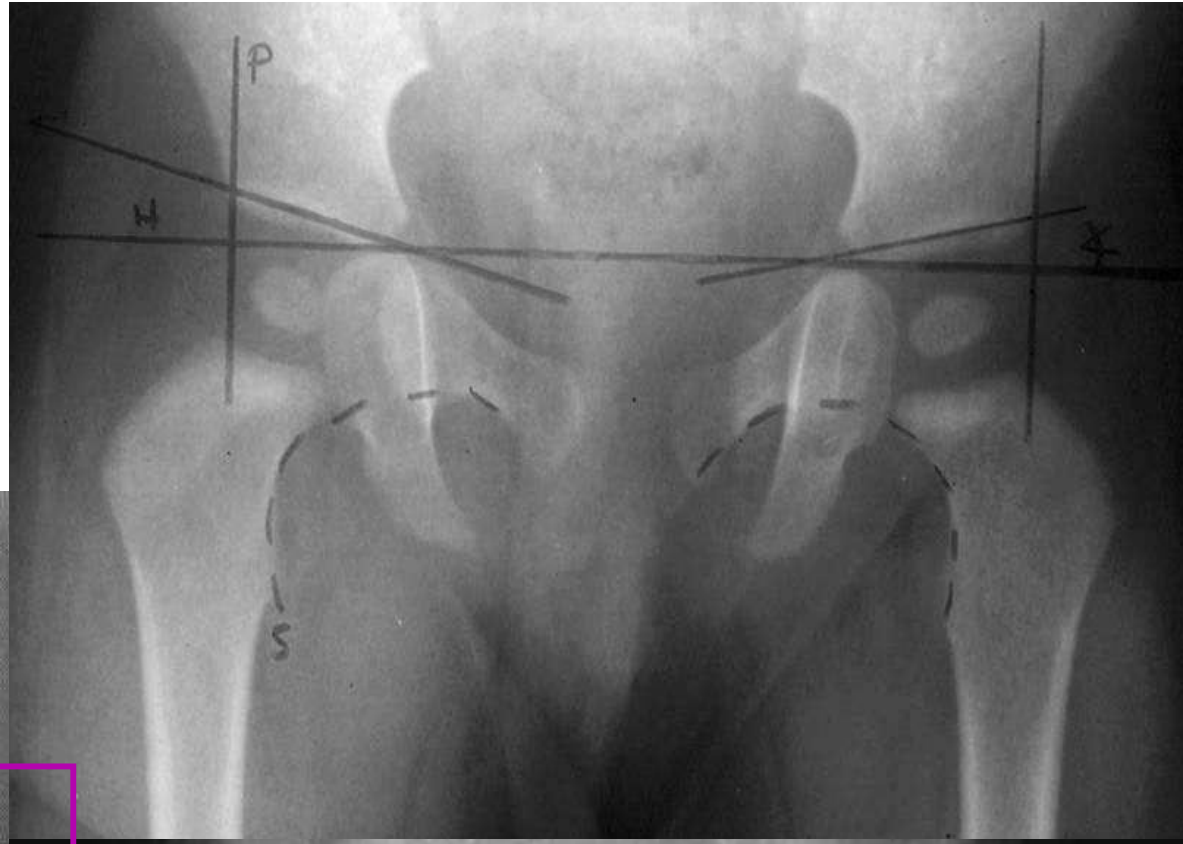
Dx? DDH of the Left Hip

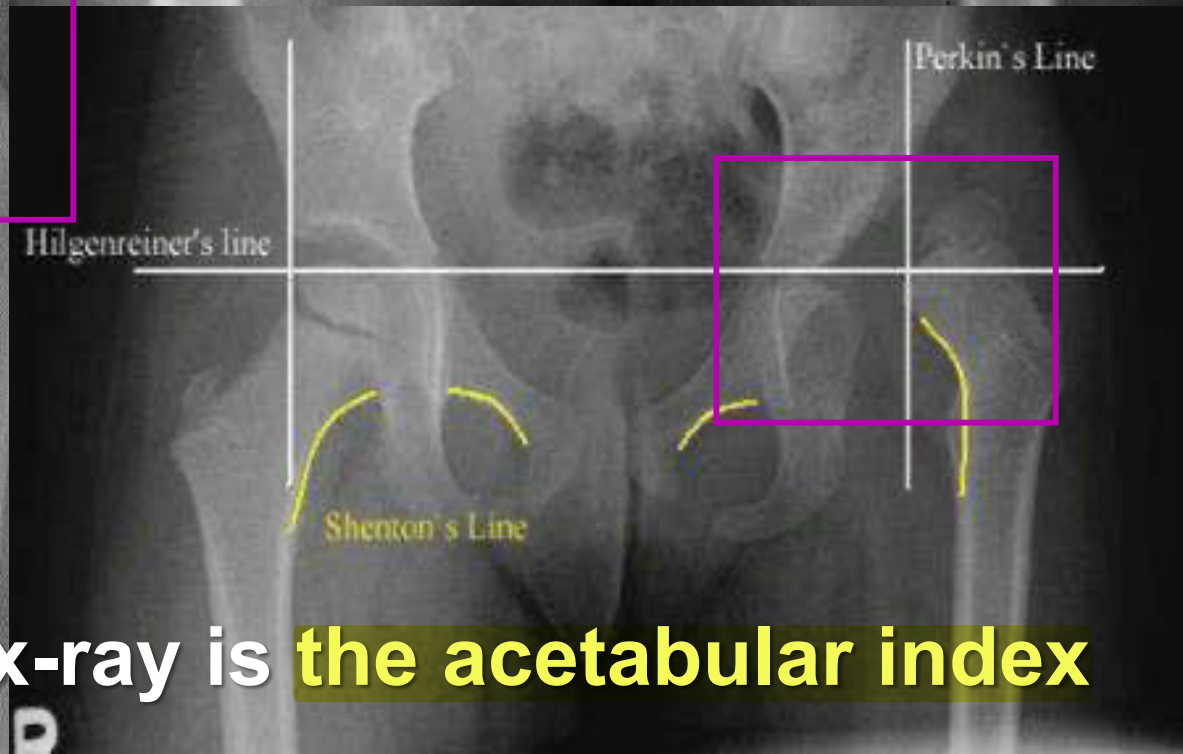
(Developmental Dysplasia of the Hip)



DDH



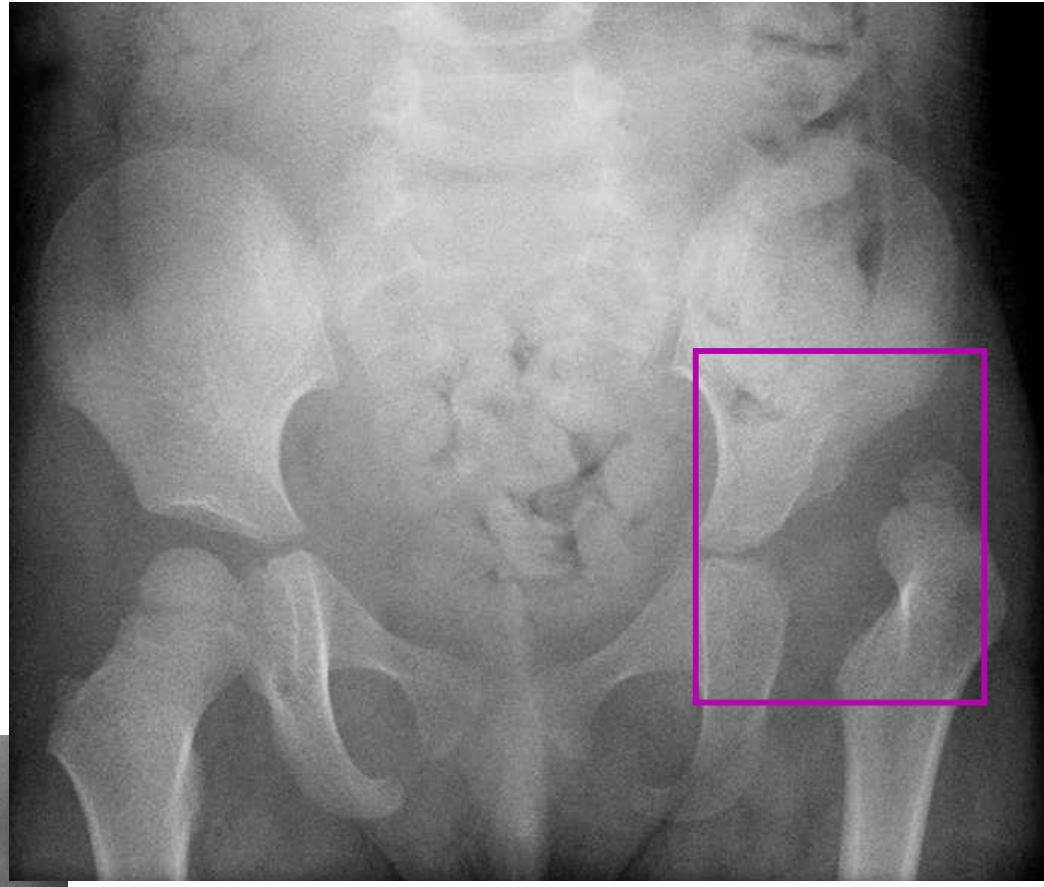


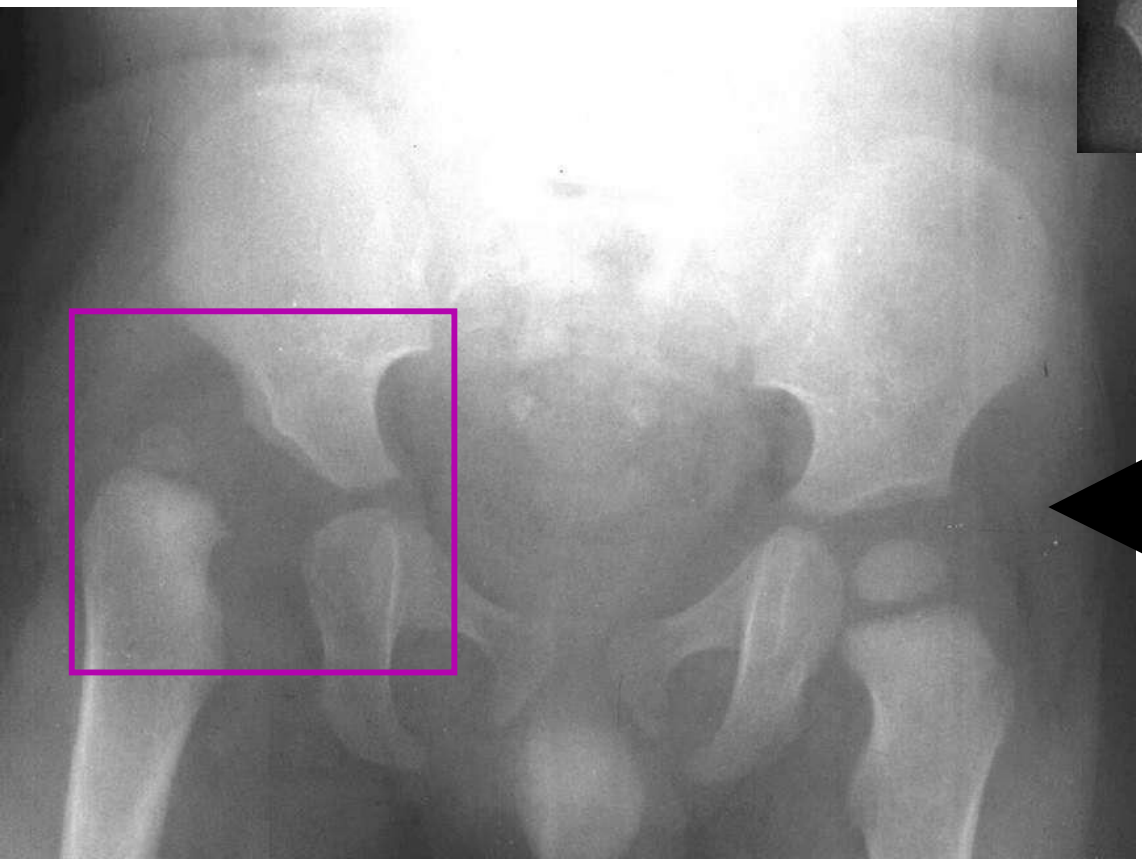


Note: the best sign on x-ray is the acetabular index

DDH

Left Sided





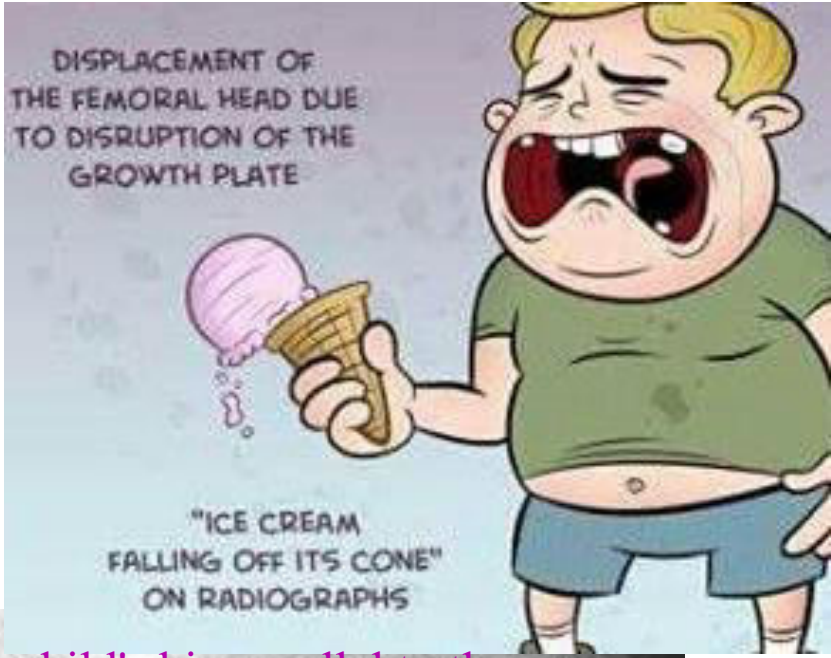
Right Sided

Packaging disorders :

1) DDH
2) Metatarsus adducts
3) Torticollis
4) Calcaneovalgus

Dx?

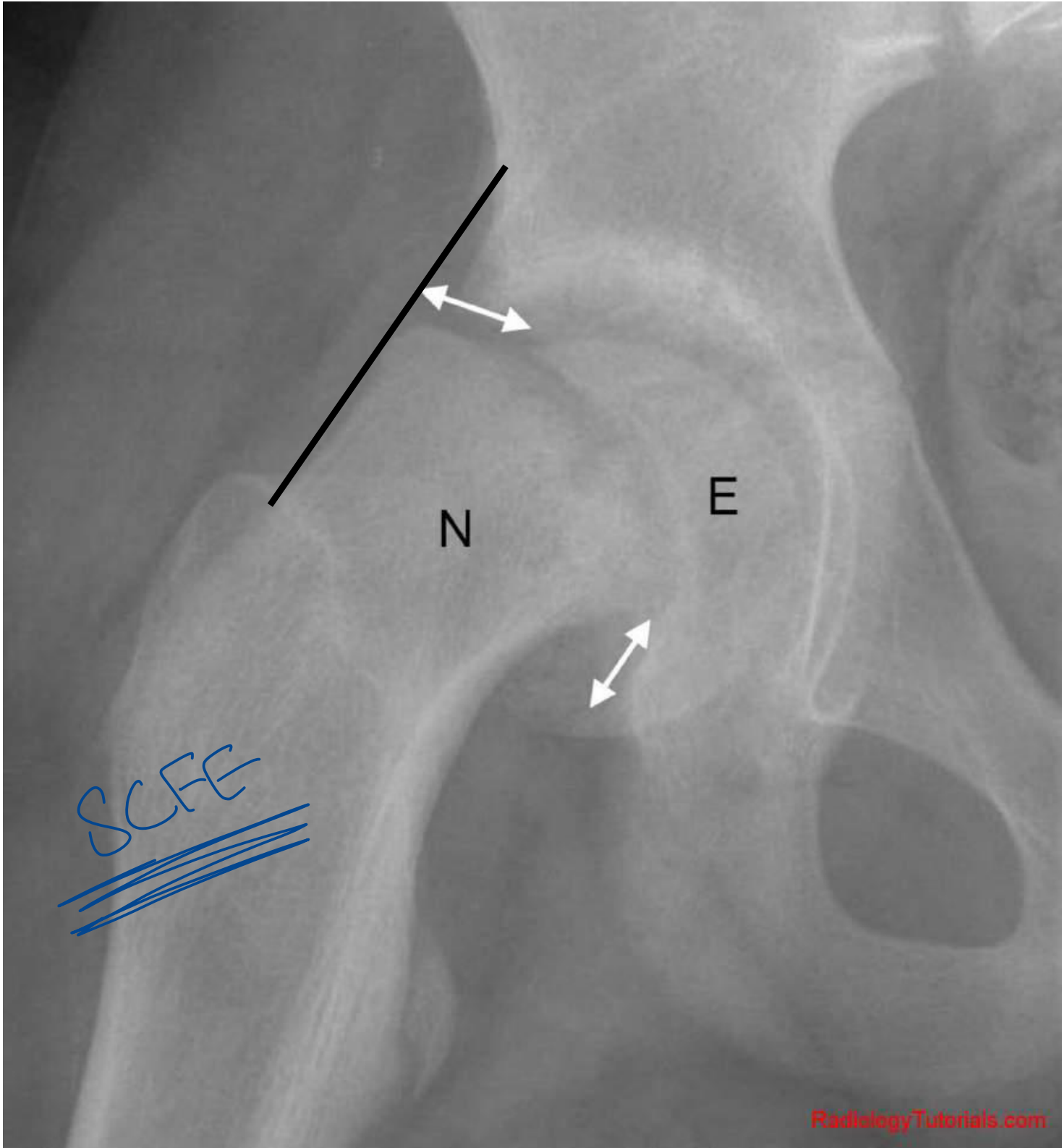
Bilateral Slipped Capital Epiphysis



Klein's line is a virtual line that can be drawn on an X-ray of a child's hip parallel to the upper edge of the femoral neck. If the line does not intersect with the outermost part of the femoral head 's ball-like end, the diagnosis of a slipped capital femoral epiphysis (SCFE) is confirmed

Dx?

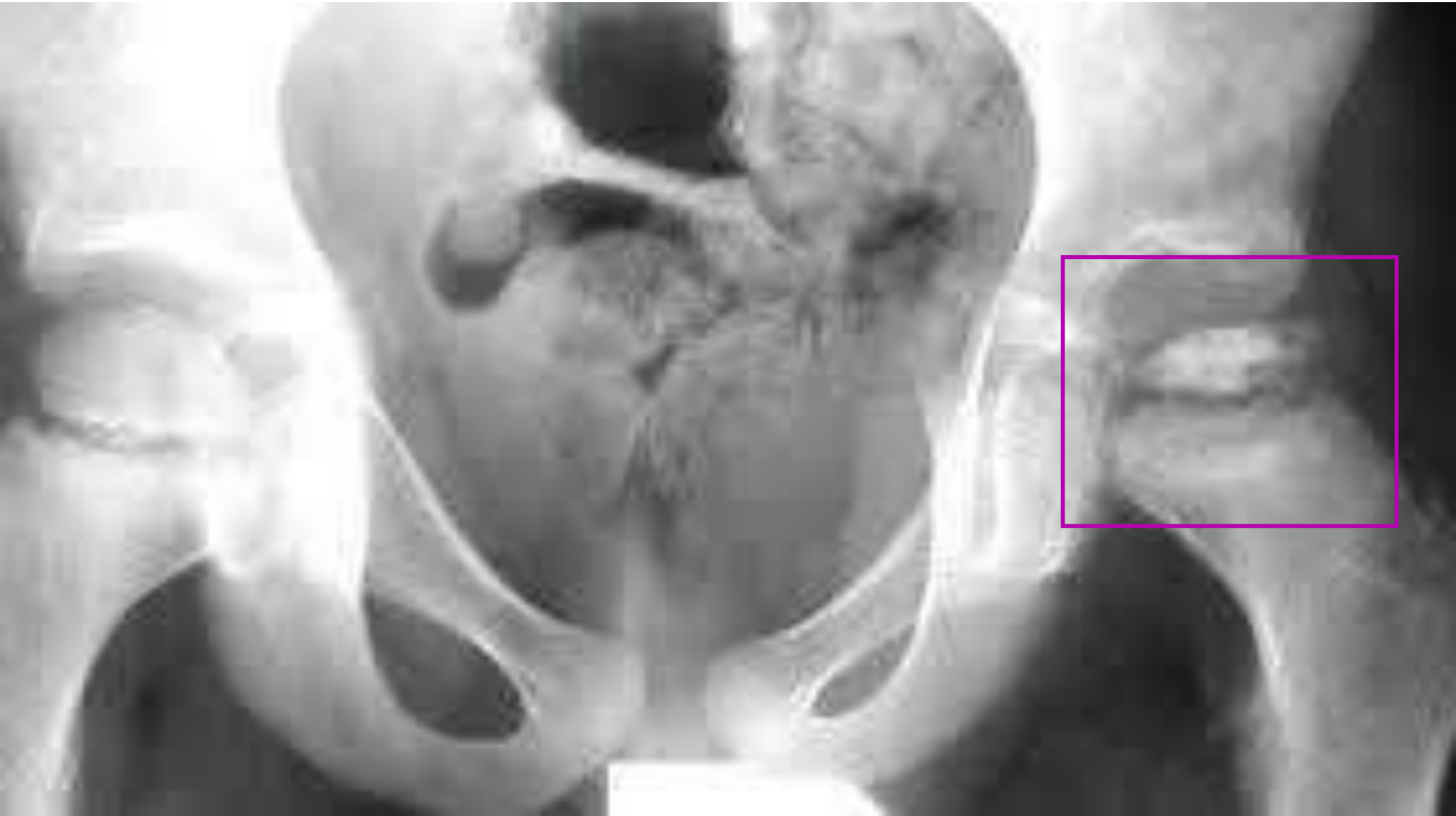
Right
Slipped
Capital
Femoral
Epiphysis



Dx? Perthes Disease

(AVN of the femur head)

Left sided (Distortion of the femoral head)



Dx? Perthes Disease

(AVN of the femur head)

Right sided

Dx? Congenital Talipes Equinovarus (Club-foot)

TTT:

Conservative (poonseti) serial casting

Description:

plantar flexion supination medial rotation, except the body of talus

Dx?

Congenital Convex Pes Vulgus

Physical Examination :

- Shoulder Examination :

Kennedy hawkins test

supraspinatus tendon

Relocation Test

- Hip Examination :

Thomas Test for Diagnosis of fixed flexion deformity

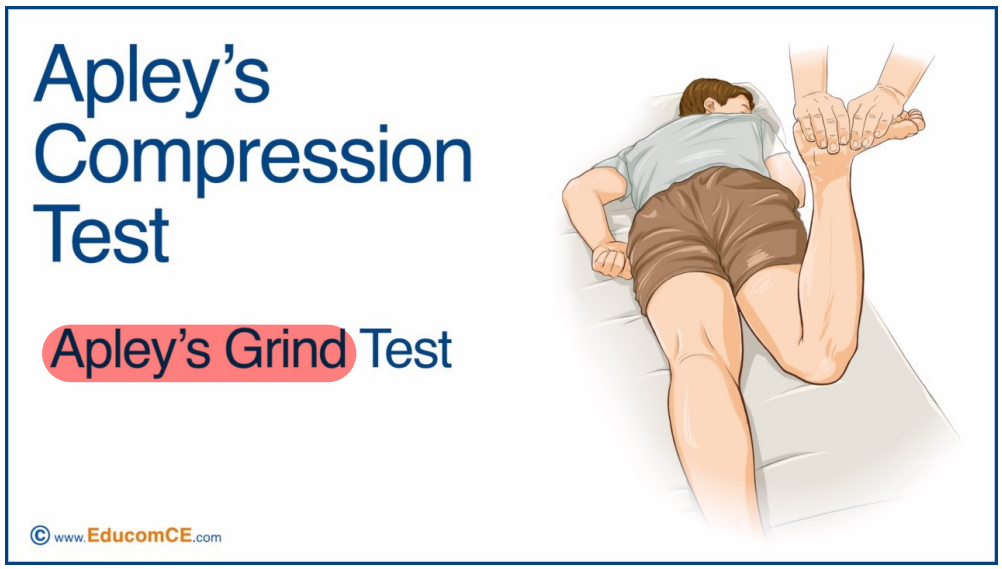
Trendelenburg test

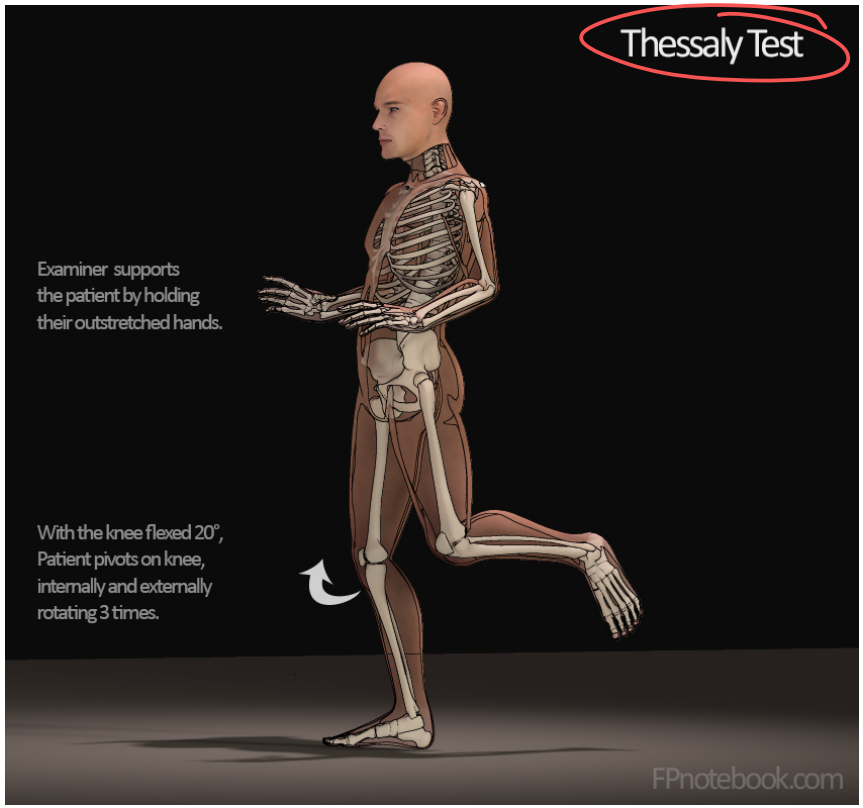
Rt side affected →

- Knee Examination :

McMurray Test

Posterior Drawer test for PCL Injuries





- Wrist and Hands Examination :

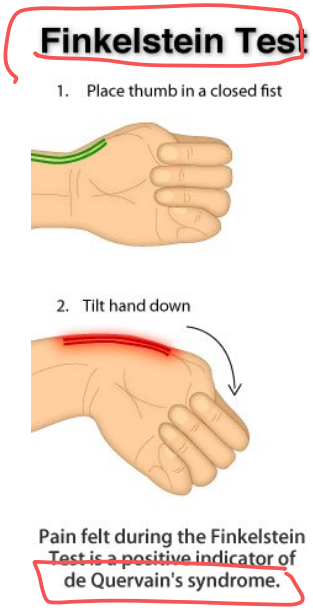
Piano-Key Sign Test is a test carried out for the clinical assessment of wrist instability. It is used as an indicator for distal radio-ulnar joint instability and tears of the triangular fibrocartilage complex of the wrist.

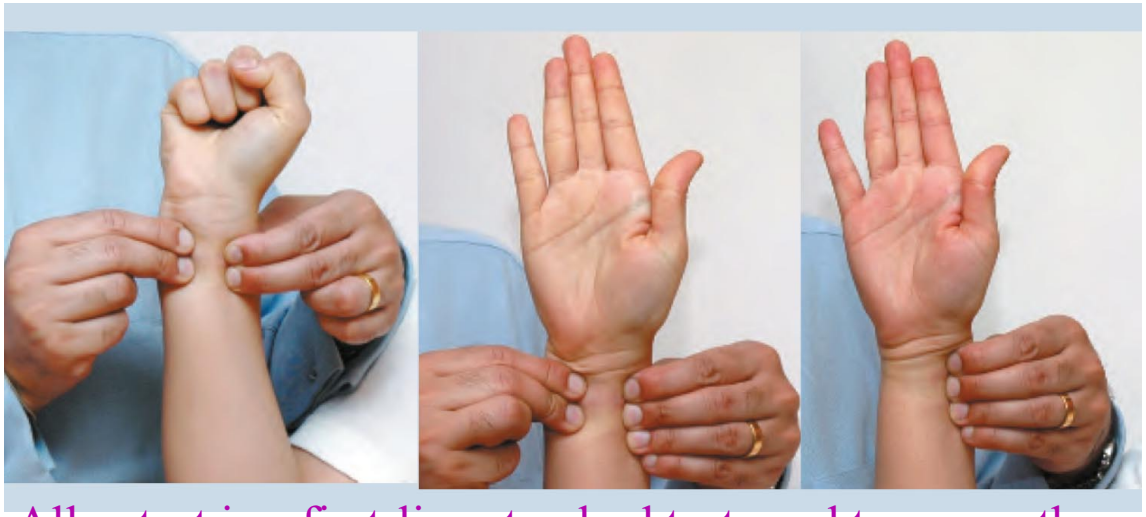
watson test for scapho-lunate instability: thumb pressure is applied to the volar aspect of wrist over distal pole of scaphoid. Move from ulnar to radial deviation. -Painful clunk is positive.

Pivot shift test: compress the wrist axially while moving it towards ulnar and radial deviation

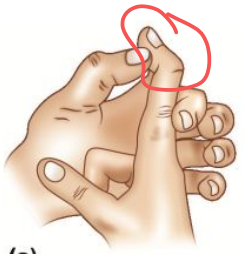
- painfull clunk…..> midcarpal instabilty.

This test (finkelstein) diagnoses two diseases:
1-tenosynovitis of 1st compartment: tenderness at radial styloid (wrist joint) 2-tenosynovitis of 2nd compartment (intersection syndrome): (tenderness 5cm proximal to wrist joint)





The Allen test is a first-line standard test used to assess the arterial blood supply of the hand. This test is performed whenever intravascular access to the radial artery is planned or for selecting patients for radial artery harvesting, such as for coronary artery bypass grafting or for forearm flap elevation.

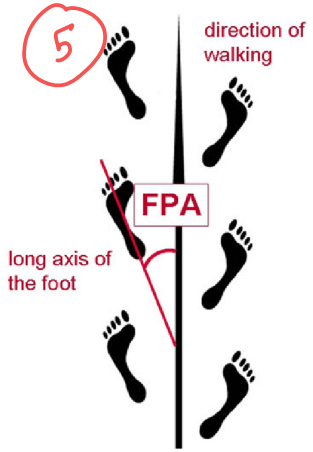


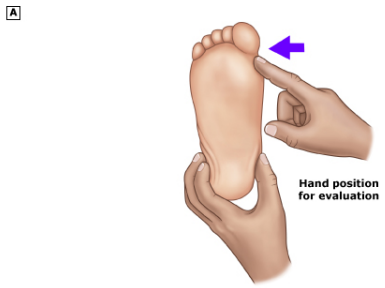
flexor digitorum profundus test

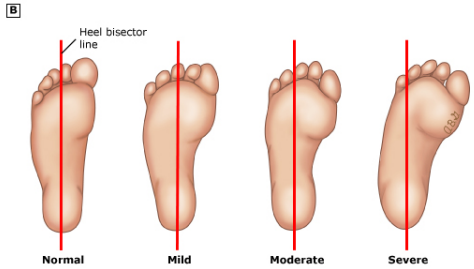
- Pediatric Examination :

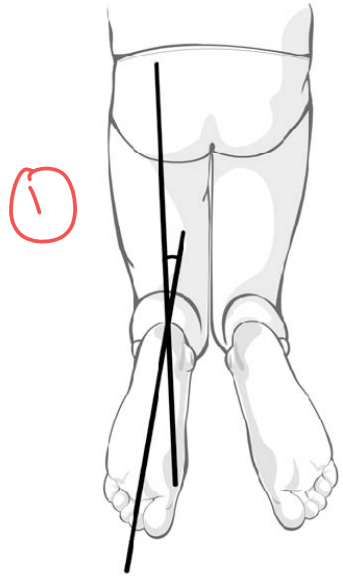
- All of the following can be used in diagnosis of Intoeing :

1 -- > Foot thigh angle
2 --> Heel Bisector line
3 --> Hip Movements " Rotation "
4 --> W shaped sitting position
5 --> Foot progression angle

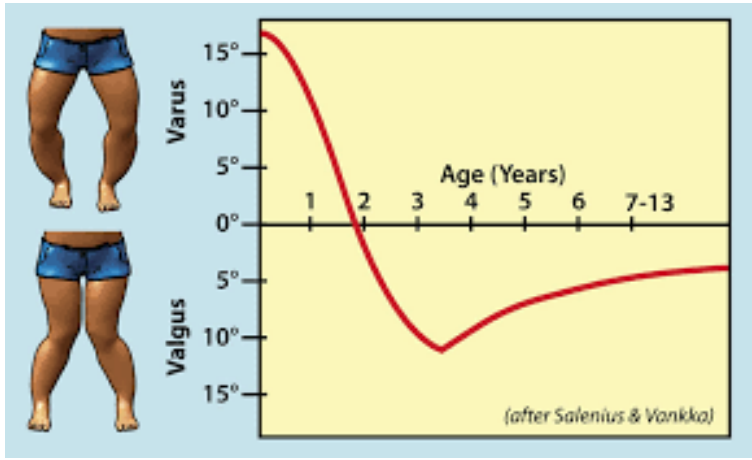








Foot → thigh
↳ progression
↳ Bisector

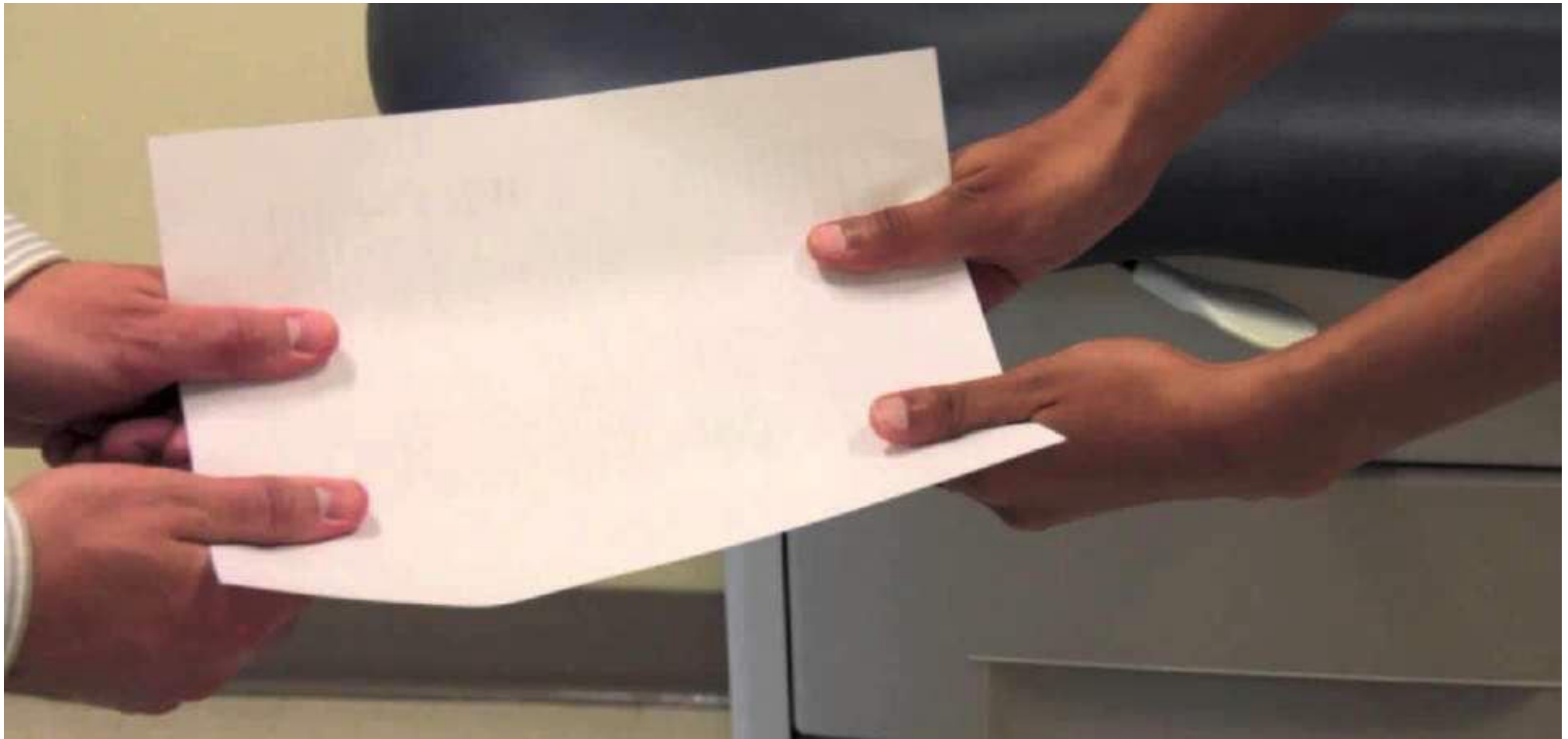


salenius and vankka scale is used in diagnosis of angulation deformities , not intoeing

What Is the name of this test ? & for what ?

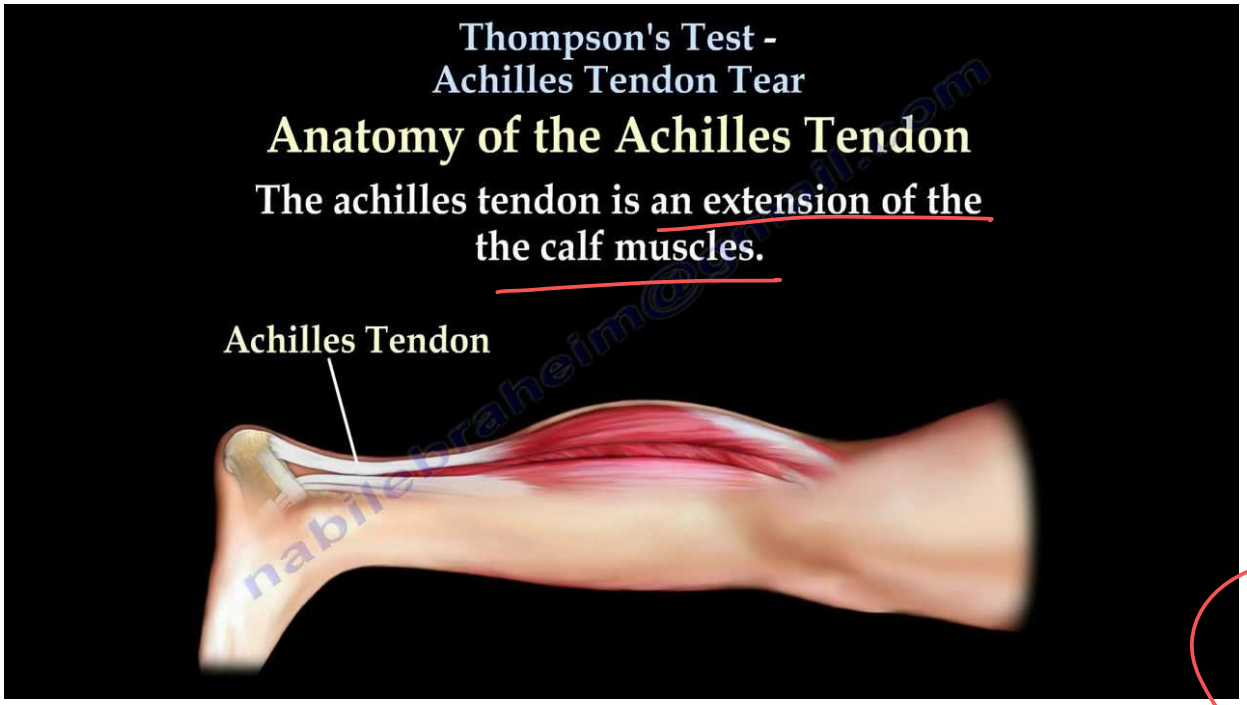
Tennis elbow test , lateral epicondylitis

- **What is this sign?** Froment's Sign
  - **For which nerve?** Ulnar nerve



Name the Test? Lachman test

The Purpose of the Test? To Examine the ACL



Thompson Test For
Achilles tendon rupture