

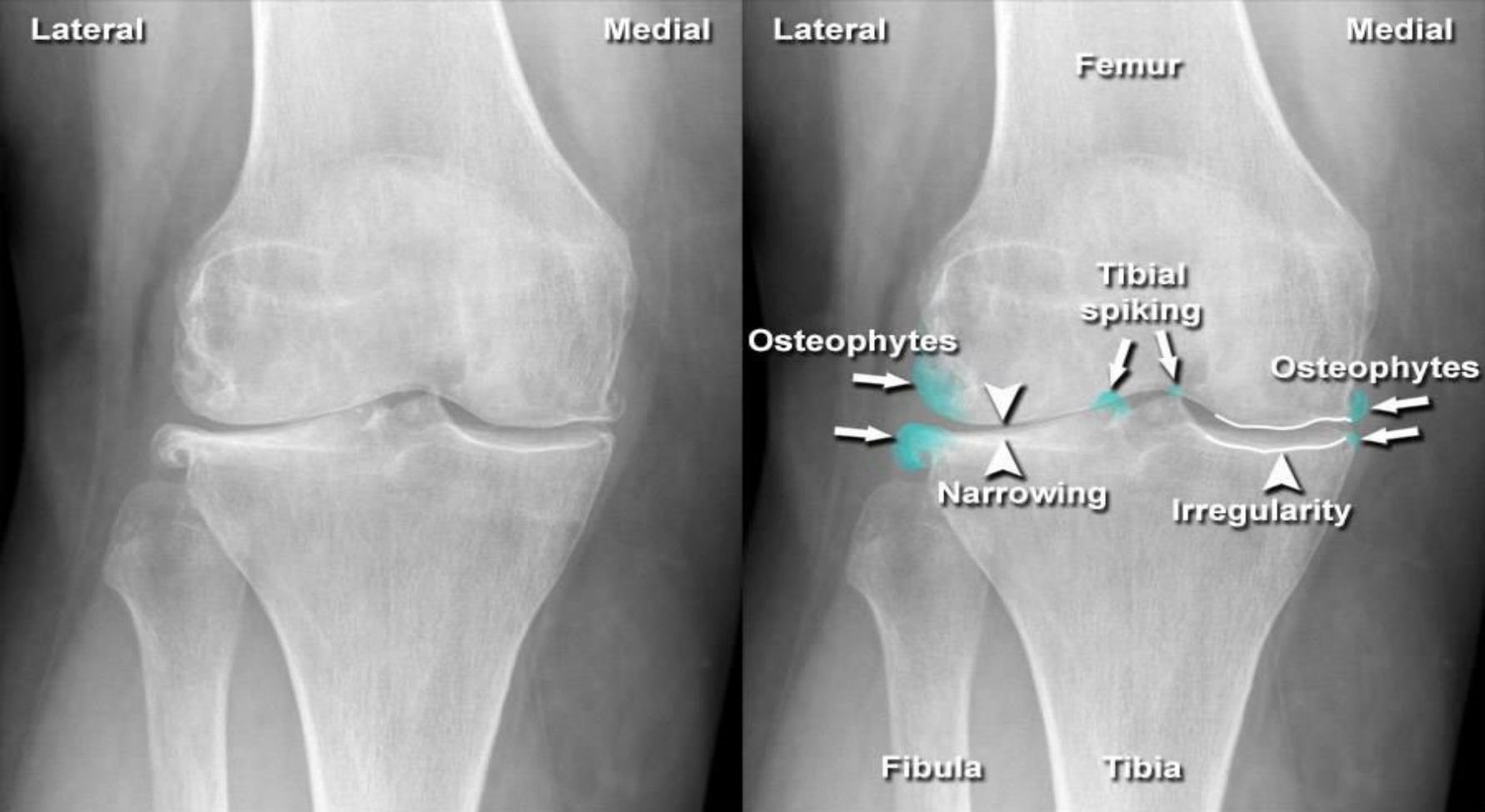
MUSCULOSKELETAL SYSTEM CASES

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MD, JBR.

CASE I

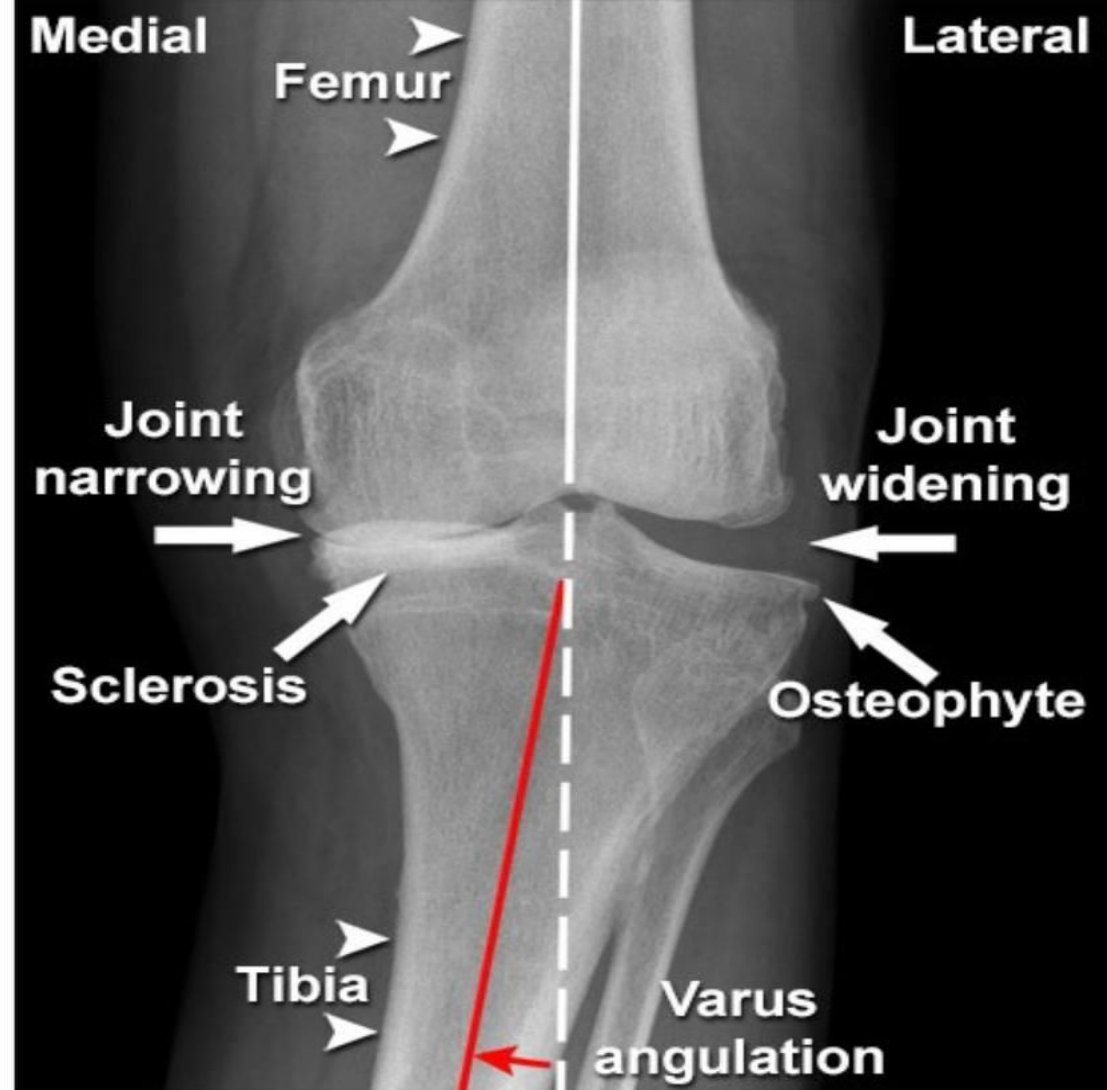


OSTEOARTHRITIS



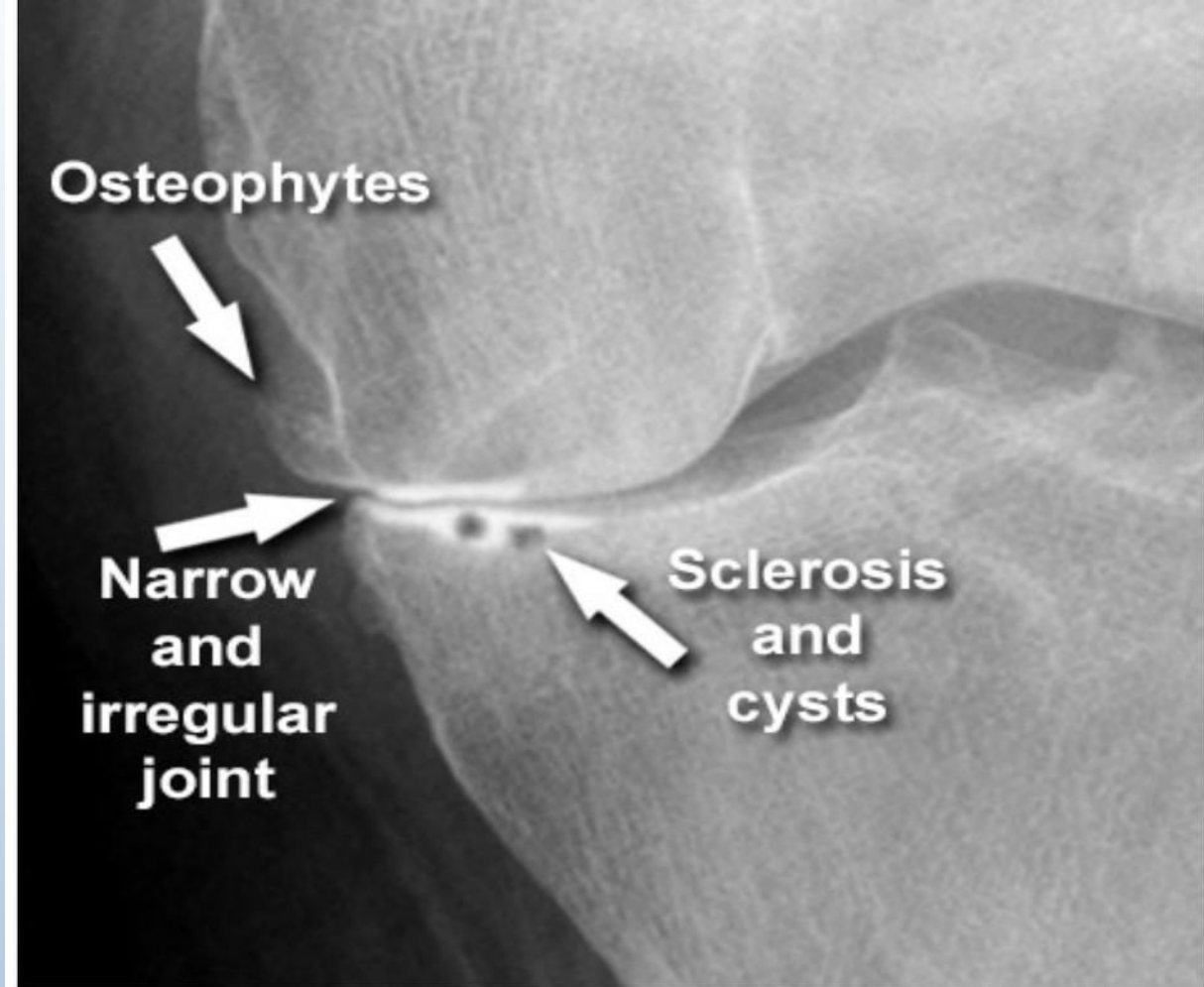
Osteophytes - Knee

- ◆ The formation of osteophytes (bone spurs) is a common feature of osteoarthritis
- ◆ This AP view of the knee shows osteophytes of the tibia and femur
- ◆ Small osteophytes have also formed at the tibial spines (tibial spiking)
- ◆ The knee joint spaces are narrowed and irregular
- ◆ See an example of a [normal knee X-ray](#).



Joint space narrowing

- ◆ The medial side of the knee joint is severely narrowed such that the femur and tibia are touching
- ◆ The lateral side of the joint is widened and there is abnormal (varus) angulation of the tibia
- ◆ Increased density indicates articular surface sclerosis



Articular surface cortical irregularity and/or sclerosis

- ◆ The joint space is narrowed and the cortical surface is irregular
- ◆ Increased density of the articular surface indicates sclerosis
- ◆ Small sub-cortical cysts have formed

CASE 2

Inversion injury to ankle. Unable to bear weight. AP and lateral views.

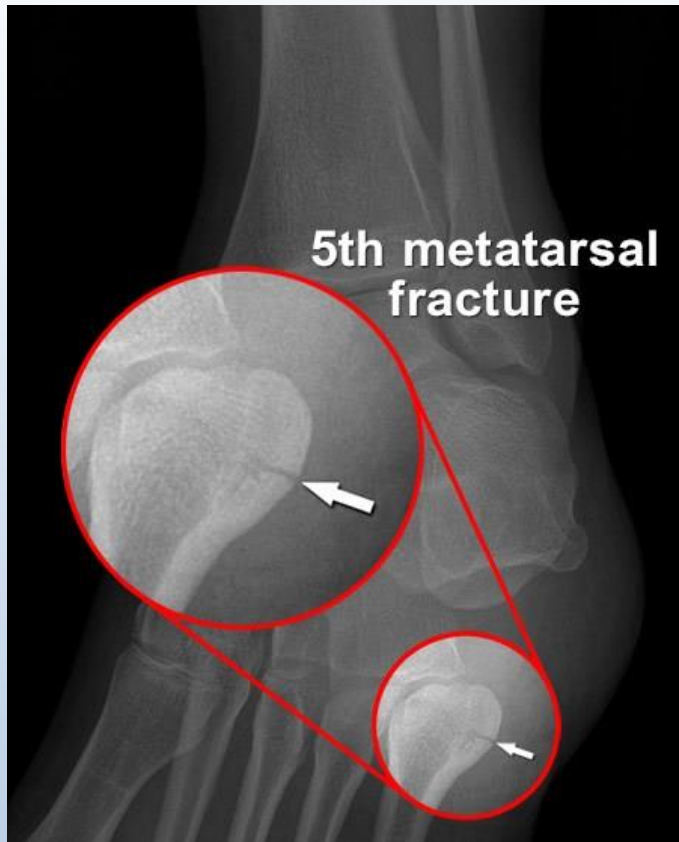


Injury



No injury





5th metatarsal base fracture.
5th metatarsal base fractures are occasionally seen on a lateral ankle view in patients with suspected ankle fractures.

CASE 3



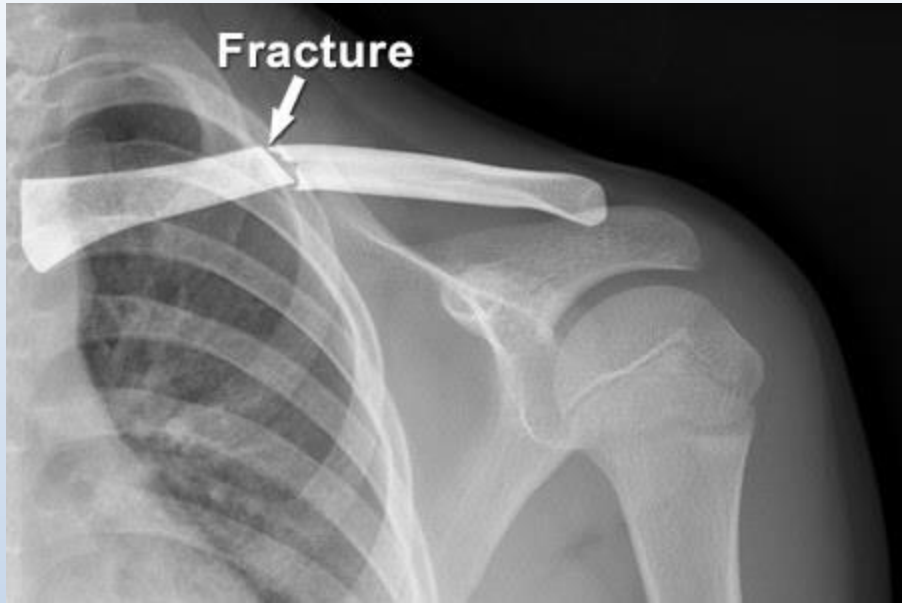
Fall on outstretched hand. Pain and restricted shoulder abduction. 2 AP clavicle views.

☐

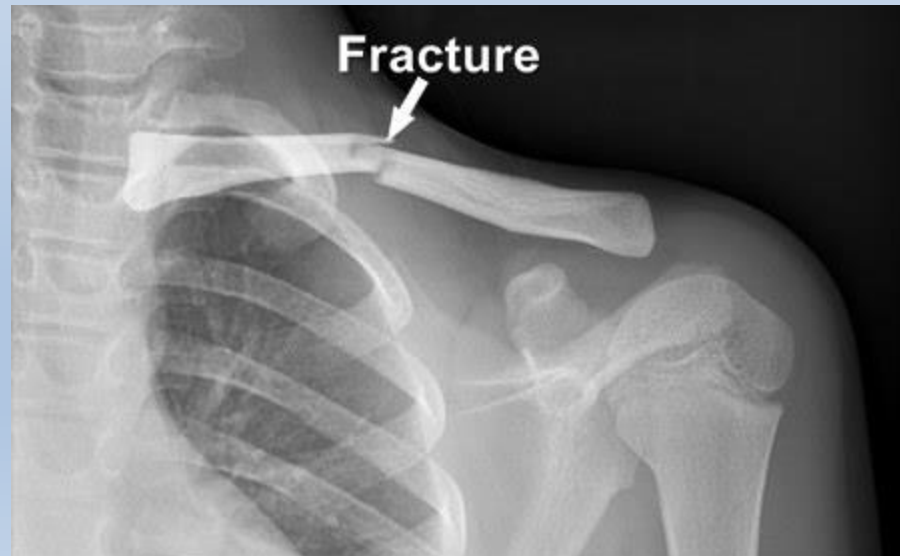
Injury

☐

No injury



Clavicle fracture.



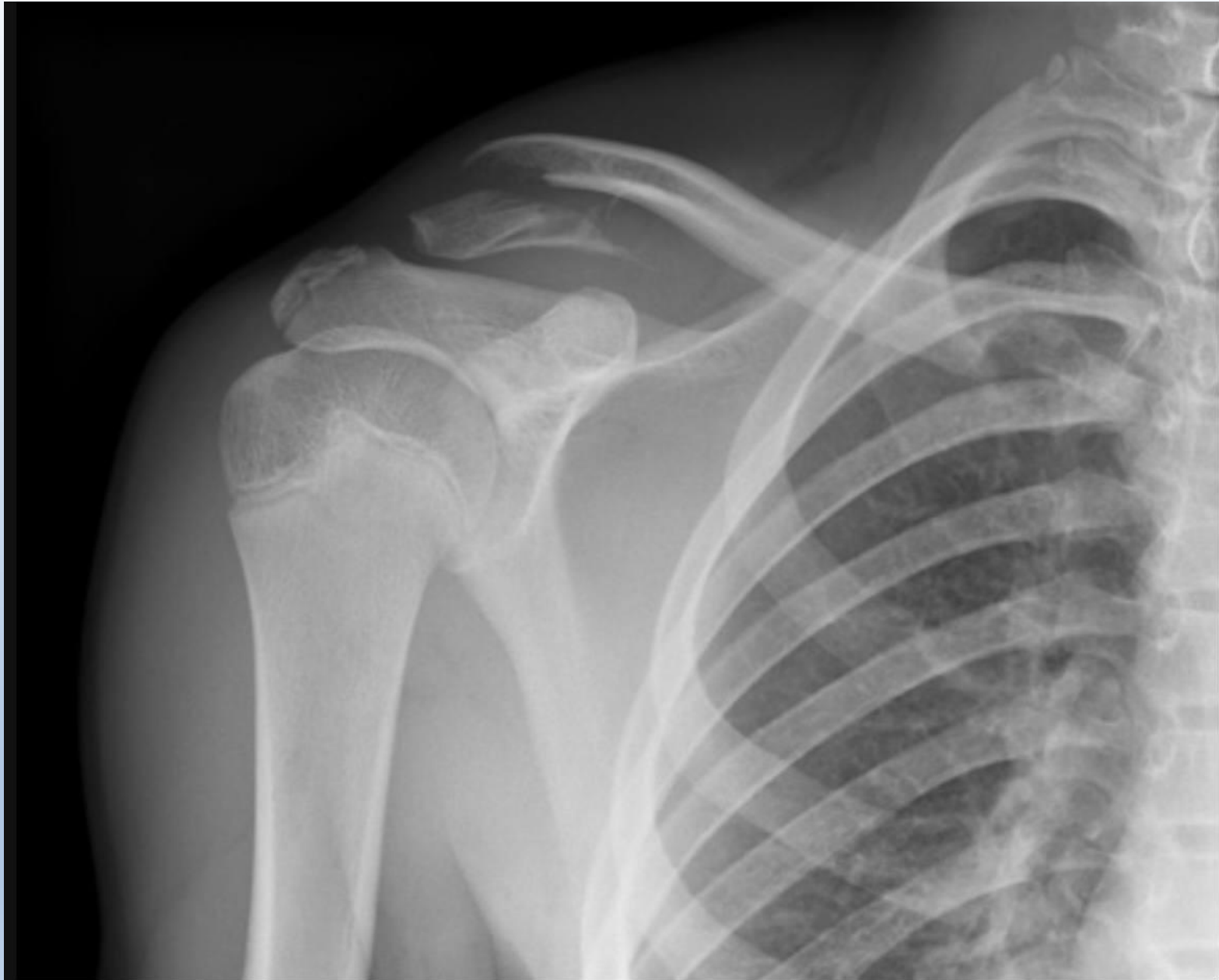
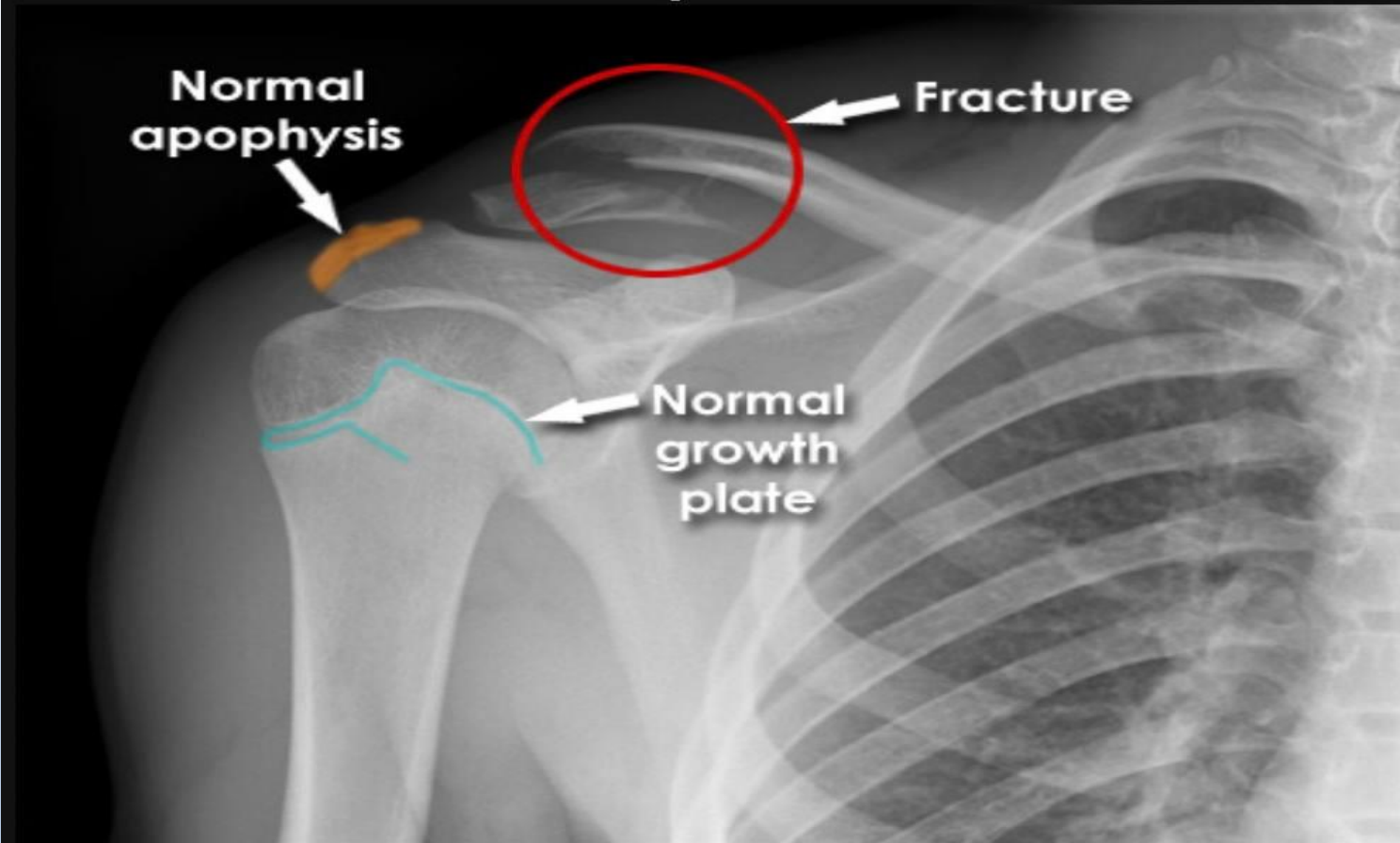


Figure 1: Lateral radiograph of the left shoulder and upper arm.

Clavicle fracture - Displaced



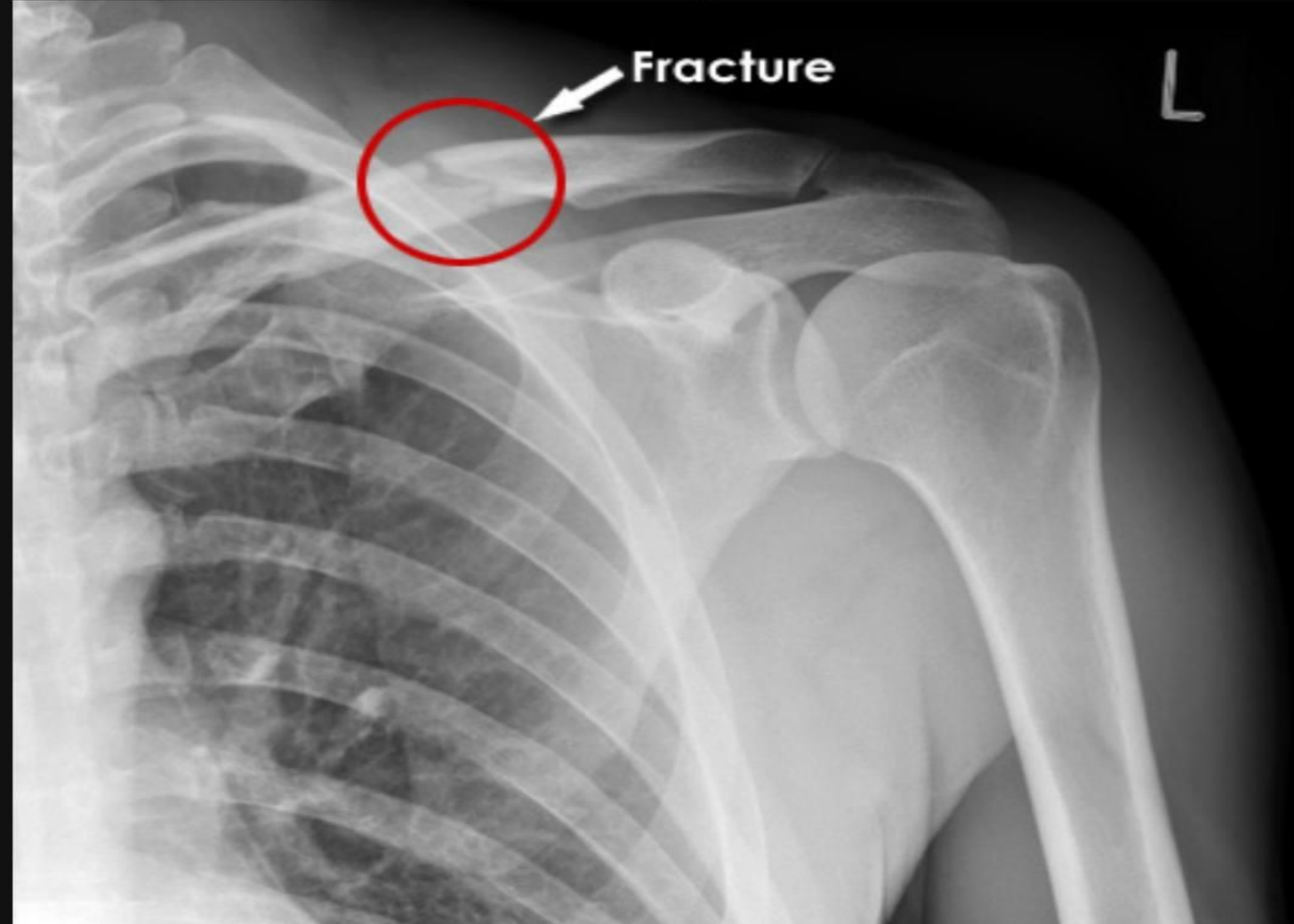
Tap on/off image to show/hide findings

Clavicle fracture - Displaced

- ◆ The distal component of this clavicle fracture is inferiorly displaced - pulled down by the weight of the arm
- ◆ The unfused growth plates of the proximal humerus and the acromial apophysis should not to be mistaken for fractures



Clavicle fracture - Undisplaced



Tap on/off image to show/hide findings

Clavicle fracture - Undisplaced

- ◆ The distal component of this clavicle fracture remains aligned with the proximal clavicle

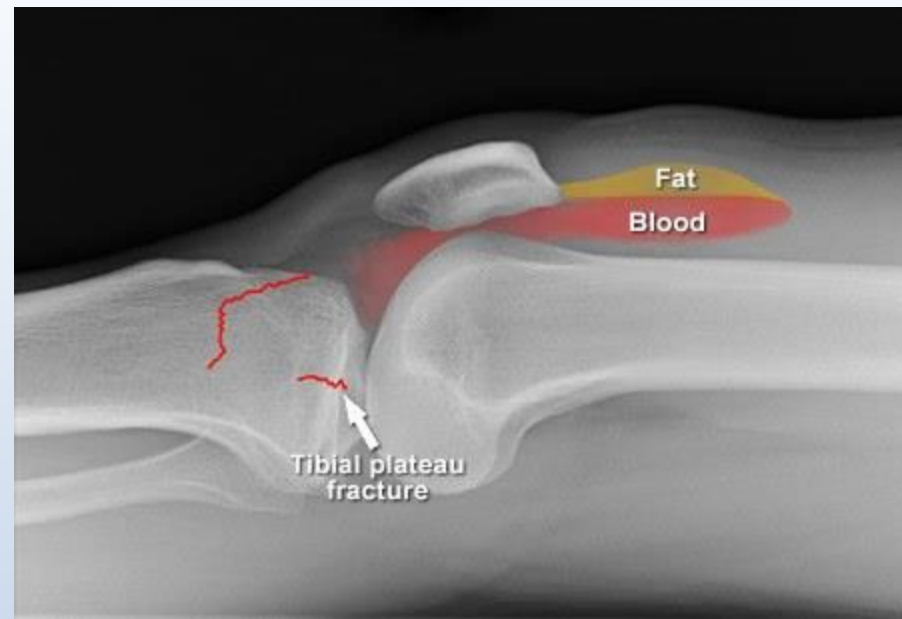
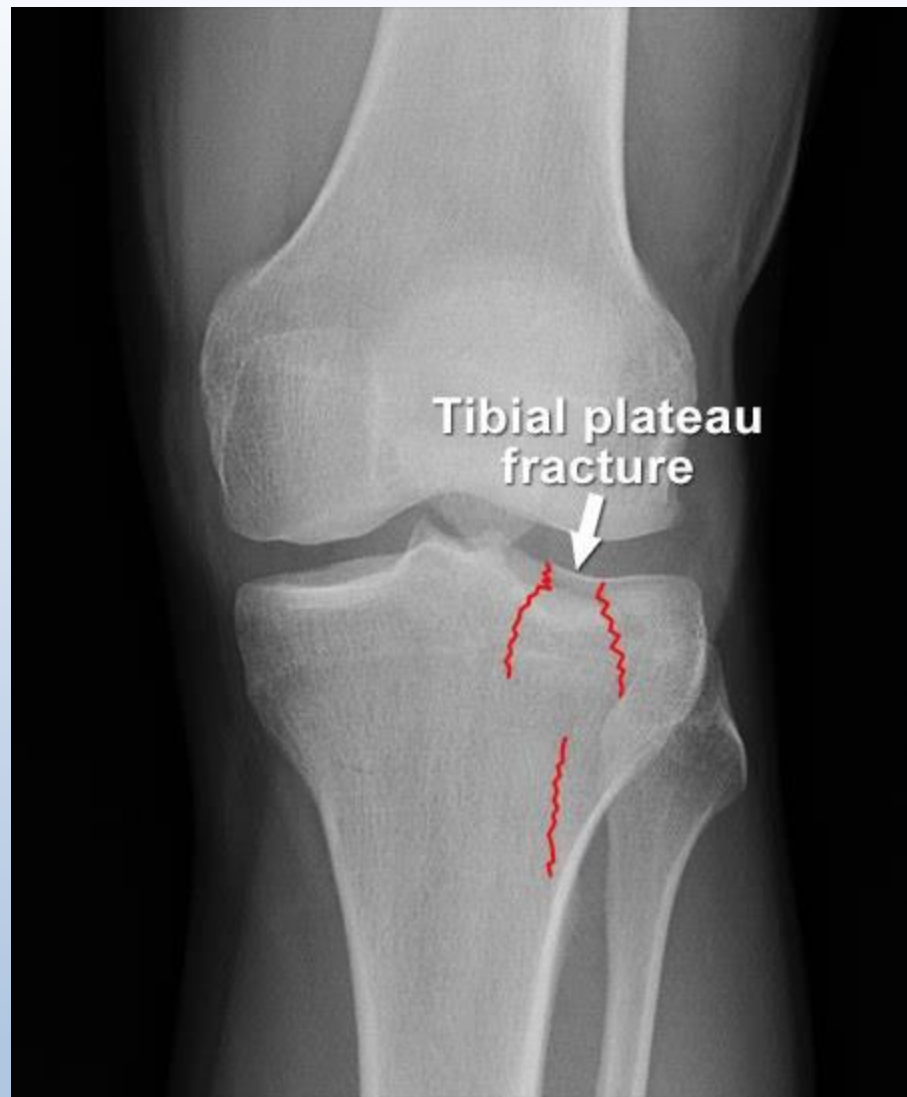
CASE 4



Fall with direct trauma to knee. Pain, swelling and reduced knee movement. AP and horizontal beam lateral views.

☒ Injury

☐ No injury



Tibial plateau fracture with lipohaemarthrosis (fat and blood in the joint).

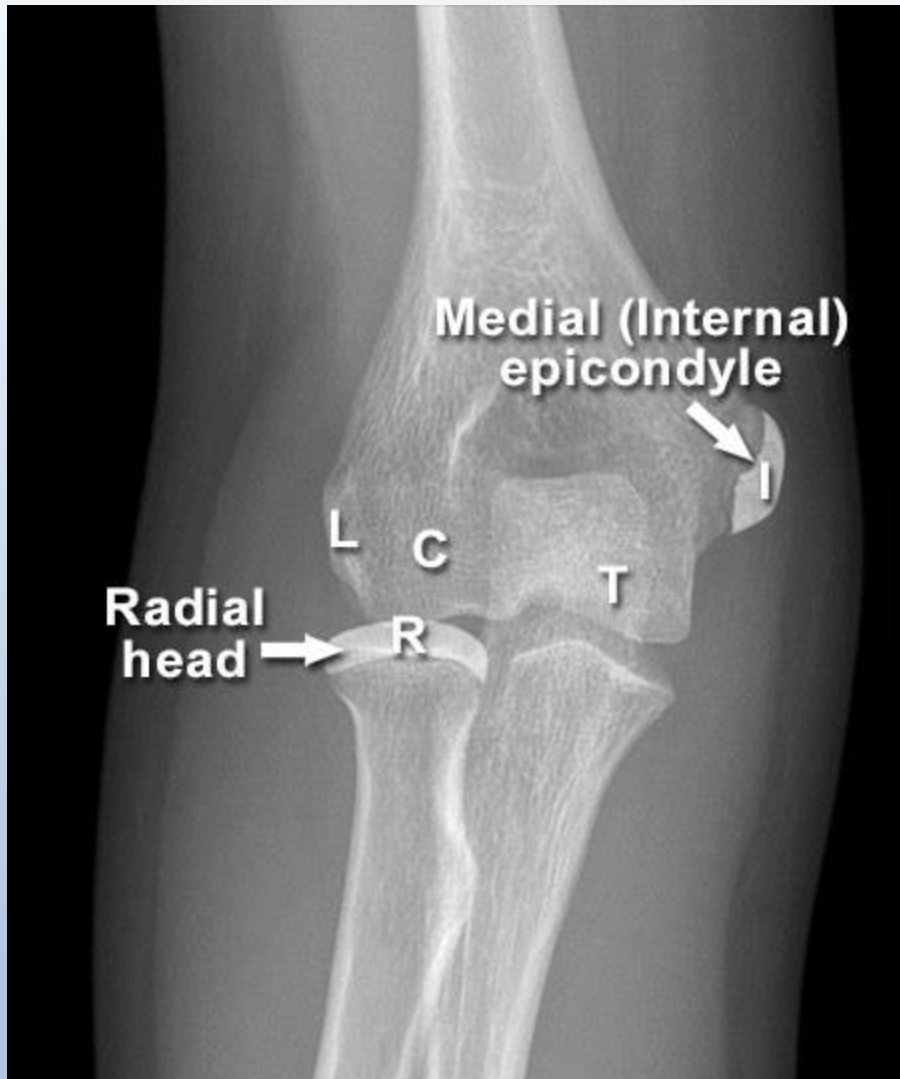
CASE 5



14-year-old boy. Fall onto elbow. Pain and reduced movement. AP and lateral views.

☒ Injury

☐ No injury



Normal elbow.

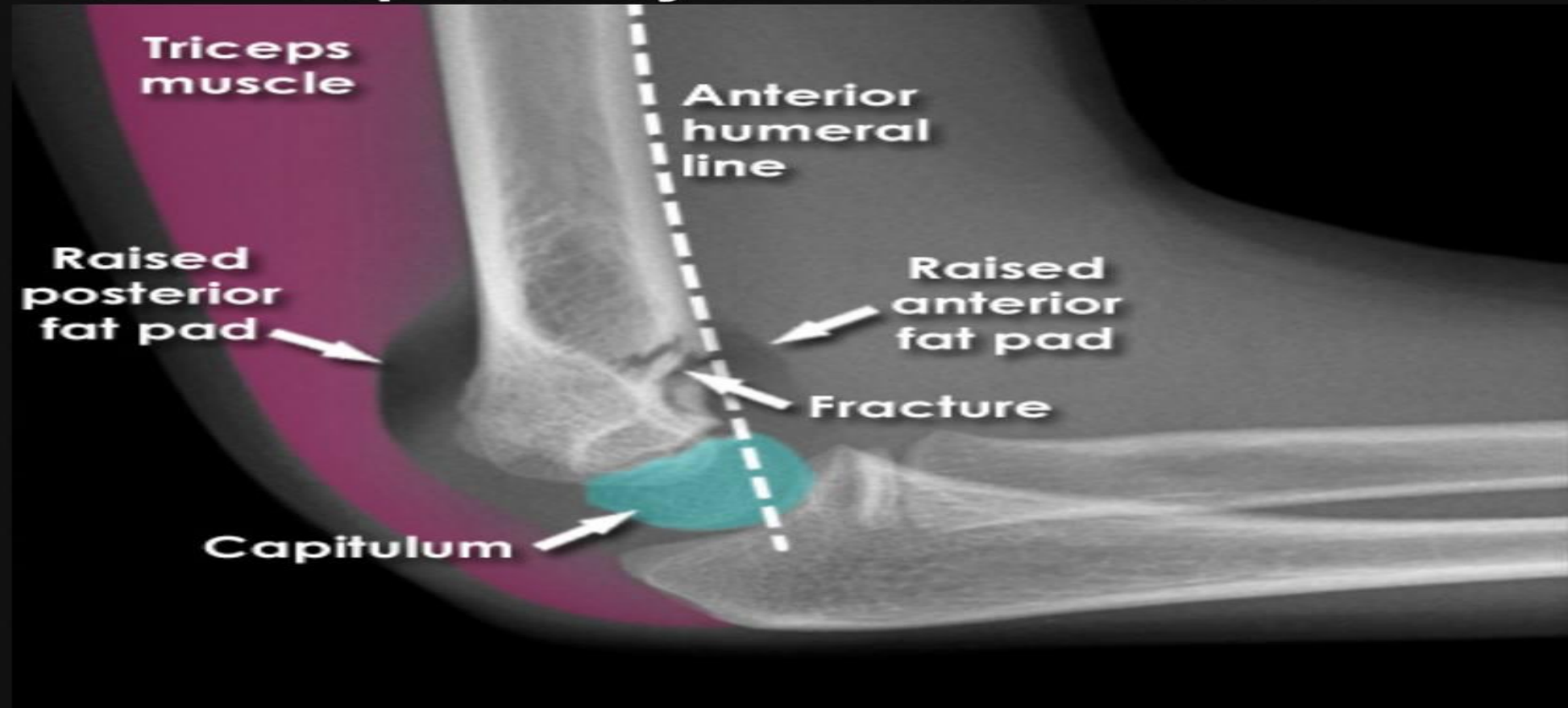
The radial head (**R**), medial (internal) epicondyle (**I**), and olecranon (**O**) ossification centres are still visible – they have not yet completely fused.

The ossification centres of the capitulum (**C**), trochlea (**T**), and lateral epicondyle (**L**) have already fused.

CASE 6



Elbow - Supracondylar fracture - Lateral

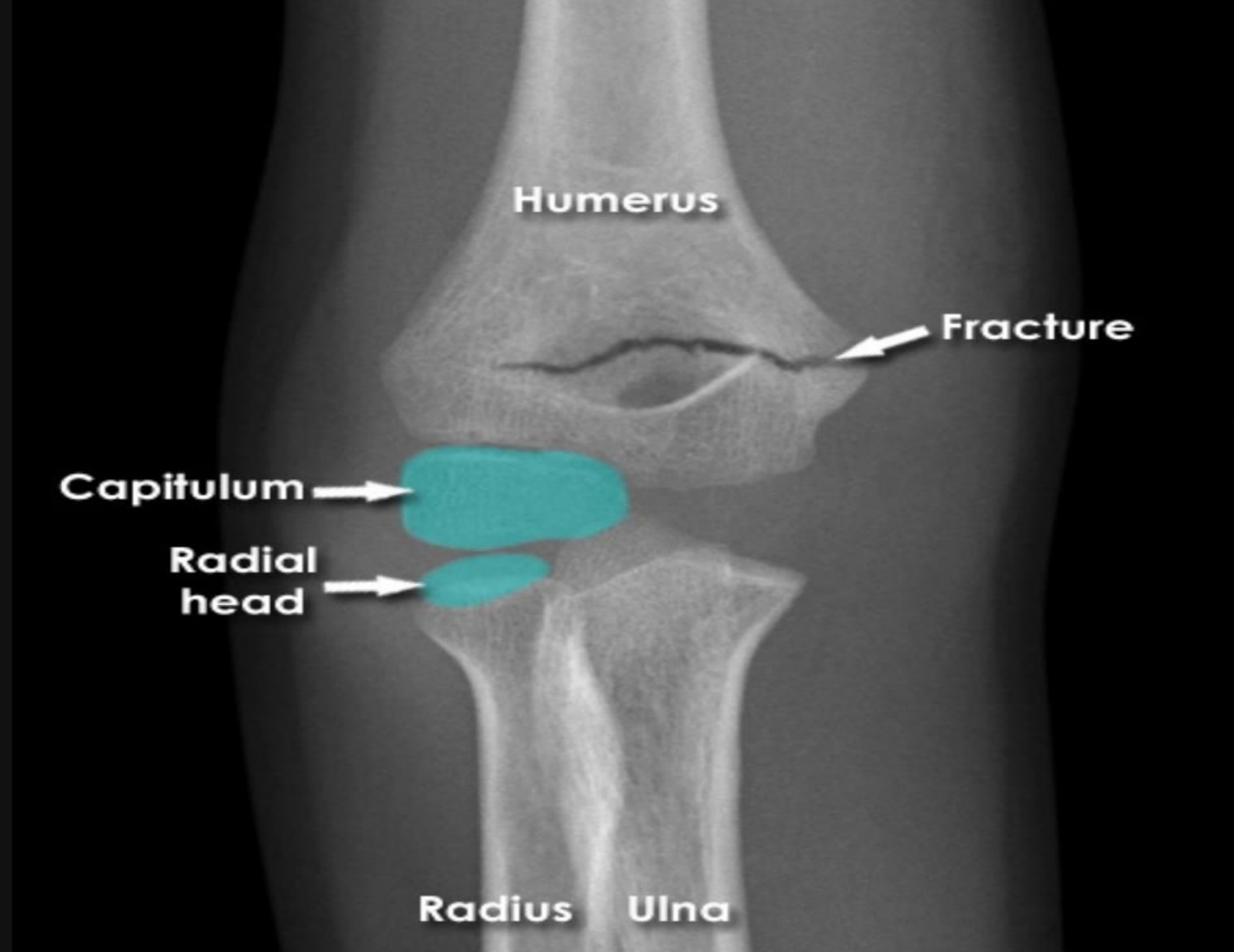


Tap on/off image to show/hide findings

Elbow - Supracondylar fracture - Lateral

- ◆ This is the commonest elbow fracture in children
- ◆ A joint effusion raises the anterior and posterior fat pads, indicating intra-capsular injury
- ◆ Less than one third of the capitulum of the humerus lies in front of the anterior humeral line
- ◆ The distal fracture fragment is pulled posteriorly by the triceps muscle





Tap on/off image to show/hide findings

Elbow - Supracondylar fracture - AP

- ◆ The fracture line is also seen clearly on the AP image in this case

CASE 7





Tap on/off image to show/hide findings

Radial head fracture - Fat pads - Lateral

- ◆ This is the commonest elbow fracture in adults
- ◆ The fracture line is not visible on the lateral view in this case
- ◆ The effusion - indicated by raised fat pads - is the only visible sign of injury and in the context of trauma should be taken to indicate an undisplaced intra-capsular fracture

Radial head fracture - AP



Tap on/off image to show/hide findings

Radial head fracture - AP

- ◆ (Same patient as image above)
- ◆ The AP view shows a fracture line which extends to the articular surface of the radial head

CASE 8



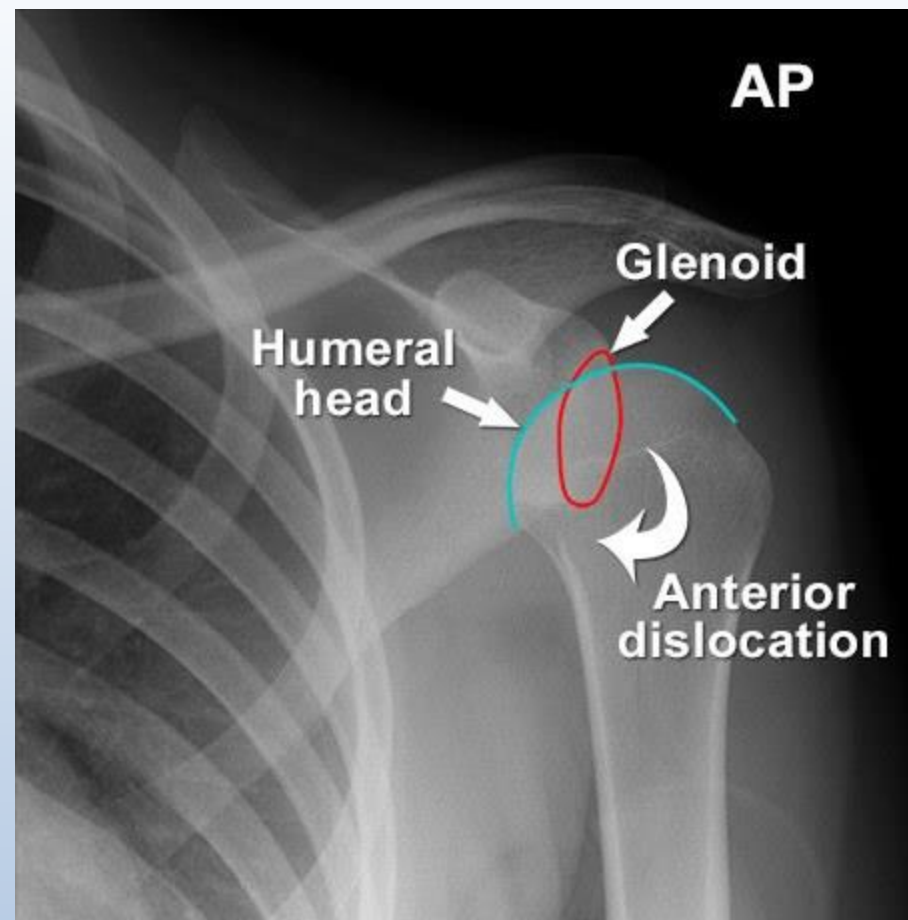
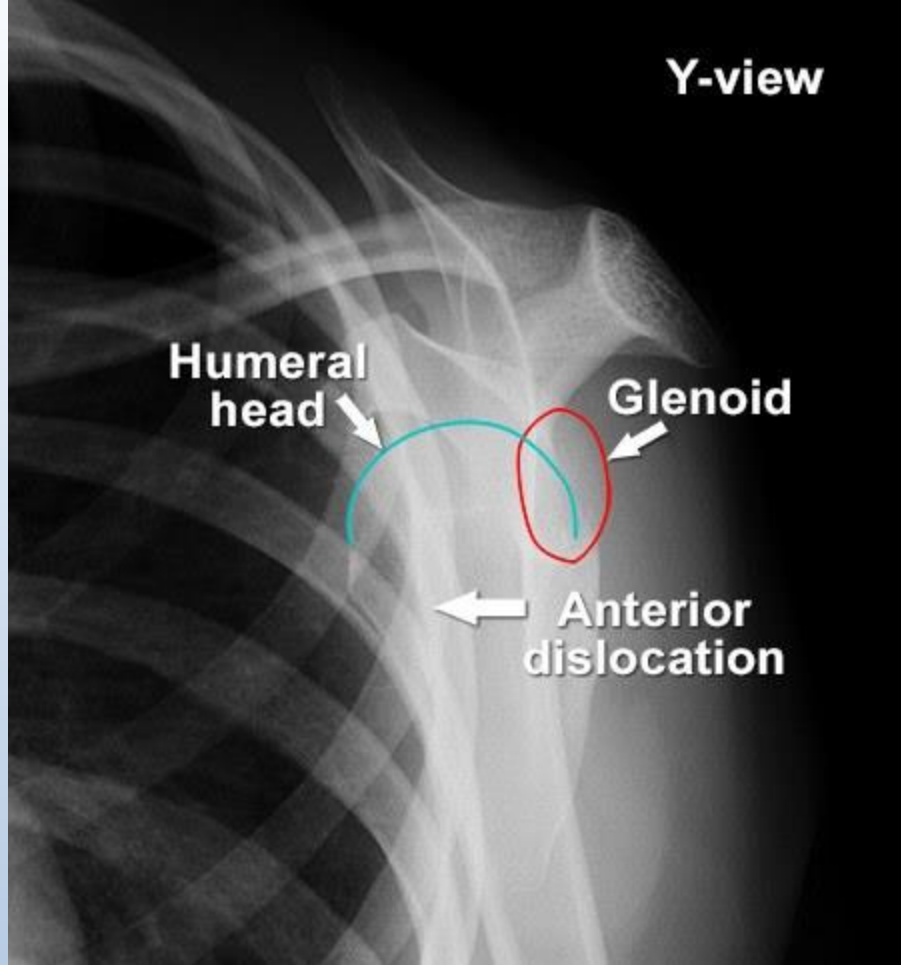
Injury to shoulder. Pain and reduced movement.



Injury



No injury



Anterior dislocation.

The humeral head is located anterior and inferior to the glenoid fossa of the scapula. This is the typical appearance of an anteriorly dislocated glenohumeral joint.

CASE 9



Twisting injury to foot. Pain and inability to weight bear. DP and oblique views.

☒ Injury

☐ No injury



Lisfranc injury.

The DP views shows the second metatarsal bone is not aligned with the intermediate cuneiform. A small bone fragment is seen on the lateral side of the second metatarsal base.

Lateral shift of the second metatarsal base indicates injury to the Lisfranc ligament. This injury can be disabling if not identified.

The oblique image shows normal alignment and no bone abnormality.

CASE 10



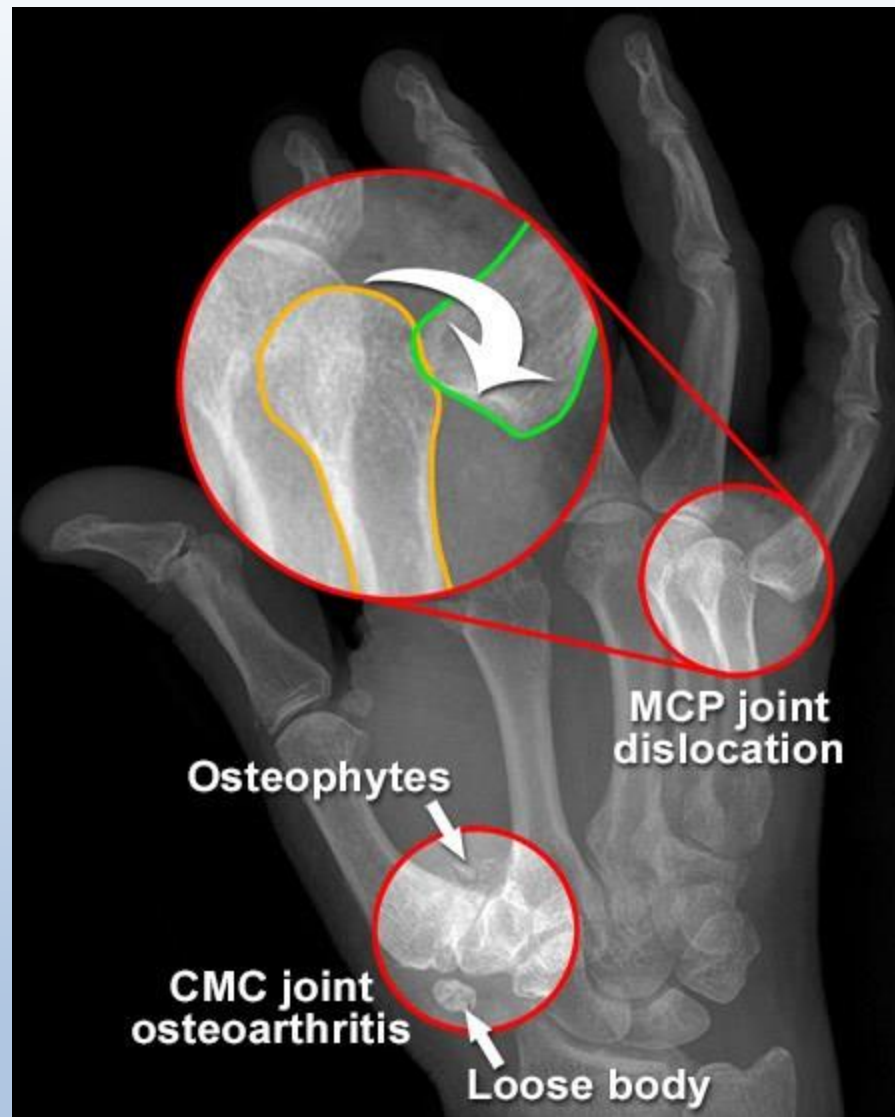
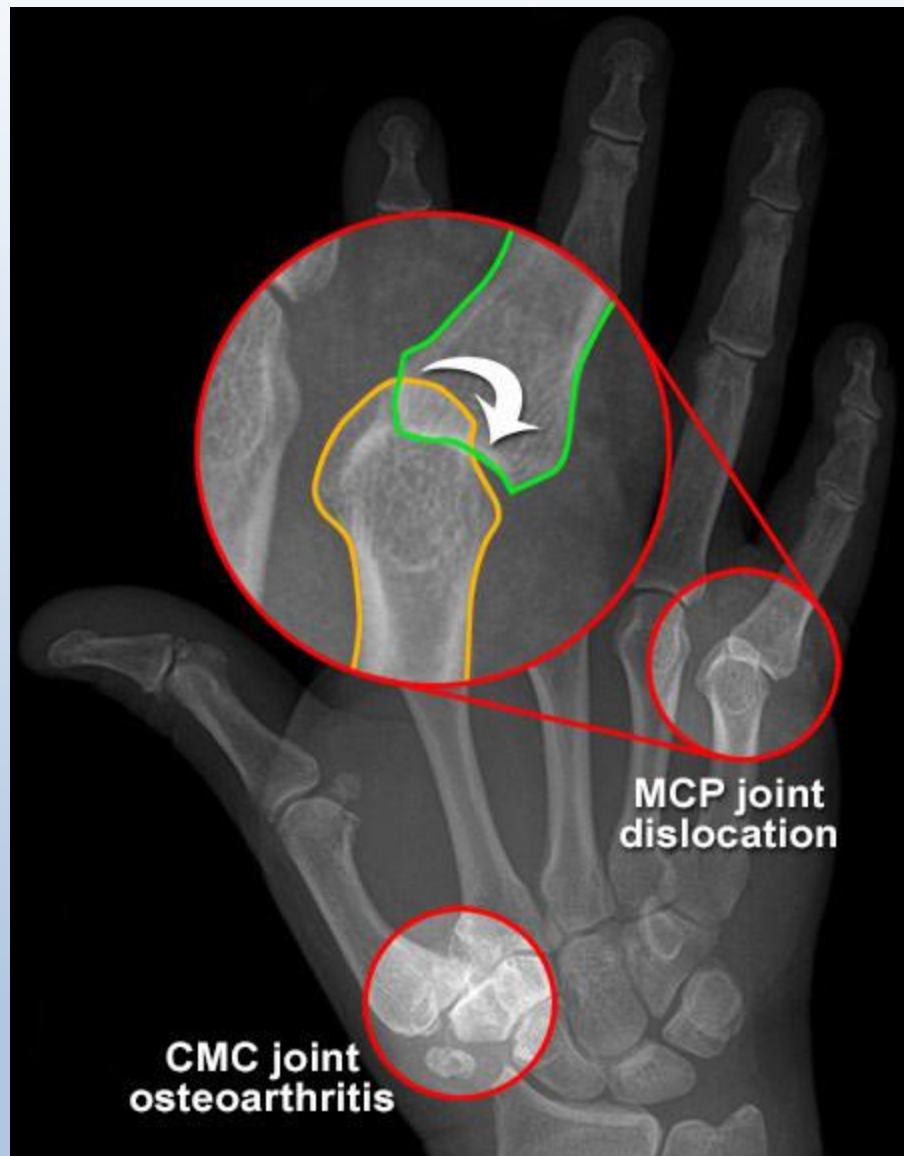
Injury to finger. DP and oblique views.

☐

Injury

☐

No injury



Little finger metacarpophalangeal dislocation.
Longstanding osteoarthritis of the thumb carpometacarpal joint (CMC joint)

CASE 11

65 year old M, hand pain, what could cause this?



GOUT

Initial hand films showed punched-out erosions with sclerotic borders

primarily involving the 5th digit of the left hand.

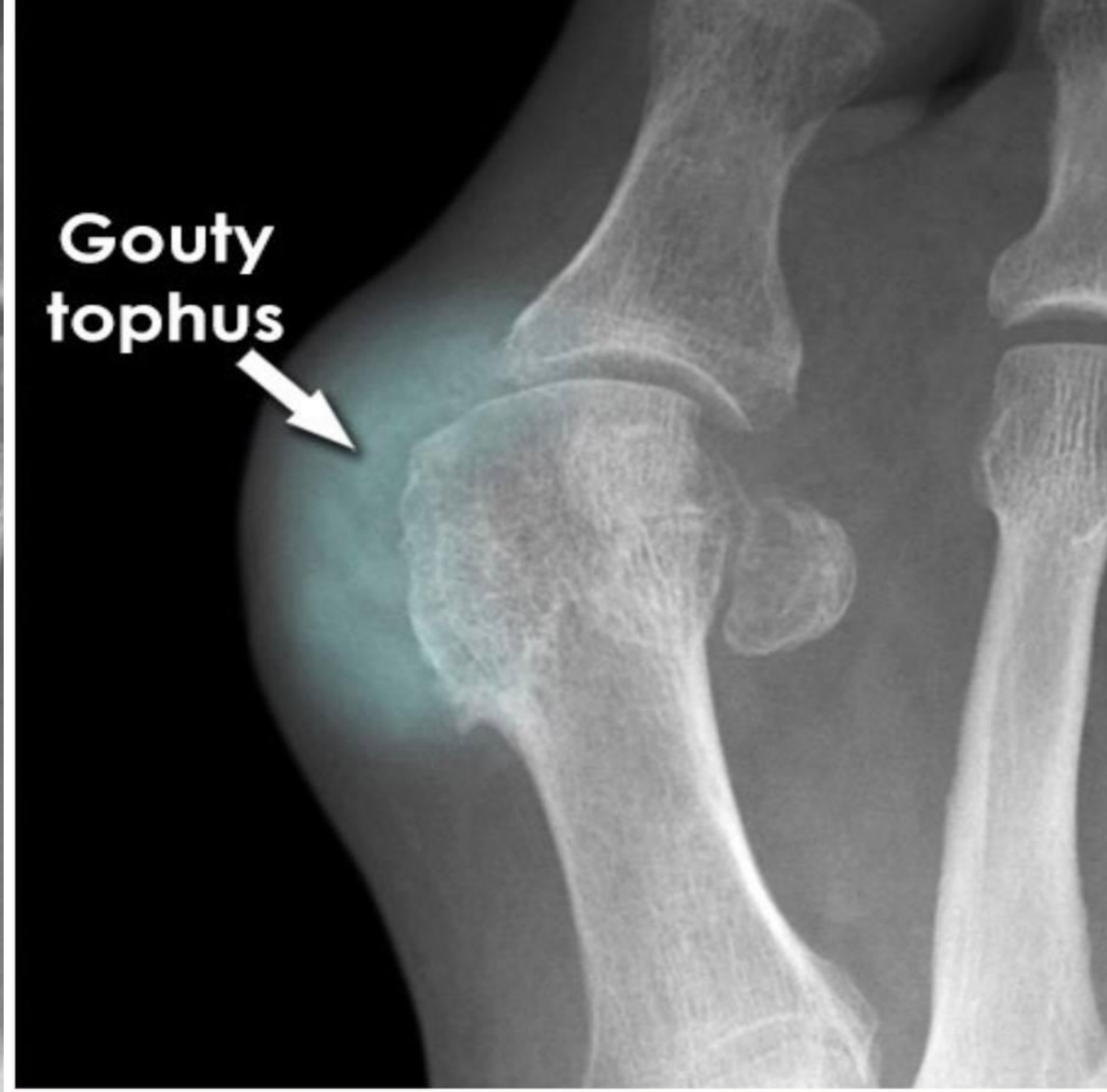


-Subsequent films, particularly the finding of a **soft tissue mass** over a destroyed 1st MTP, make the case even more clear-cut.

- CHARACTERISTIC Radiologic features of Gout:

1. Tophi
2. Normal mineralization
3. Joint space preservation
4. Punched-out erosions with sclerotic borders
5. Overhanging edge of cortex
6. Asymmetrical polyarticular distribution
7. Distributed feet > ankles > hands > elbows





**Gouty
tophus**

Gouty tophi

- ◆ Speckled increased density of peri-articular soft tissue is due to deposition of monosodium urate crystals within a gouty tophus

CASE 12



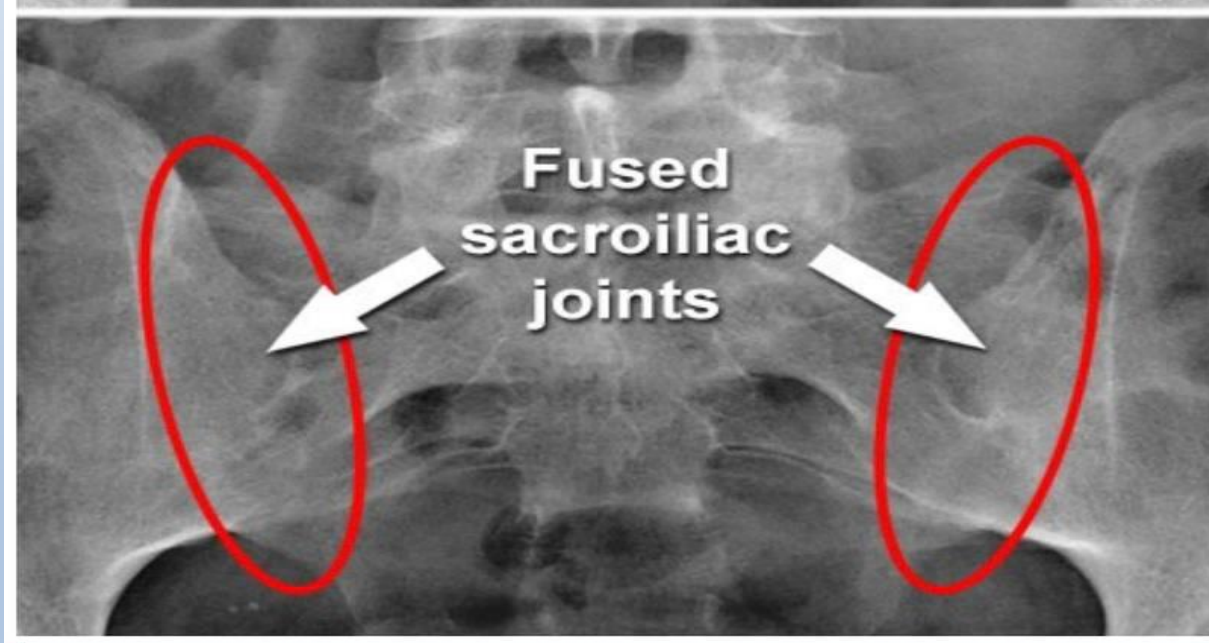
39 y/o, right hip pain, findings?





Sacroiliitis – X-ray

- ◆ Normal sacroiliac joints shown for comparison
- ◆ As sacroiliitis progresses the sacroiliac joints may widen and the articular surfaces become sclerotic



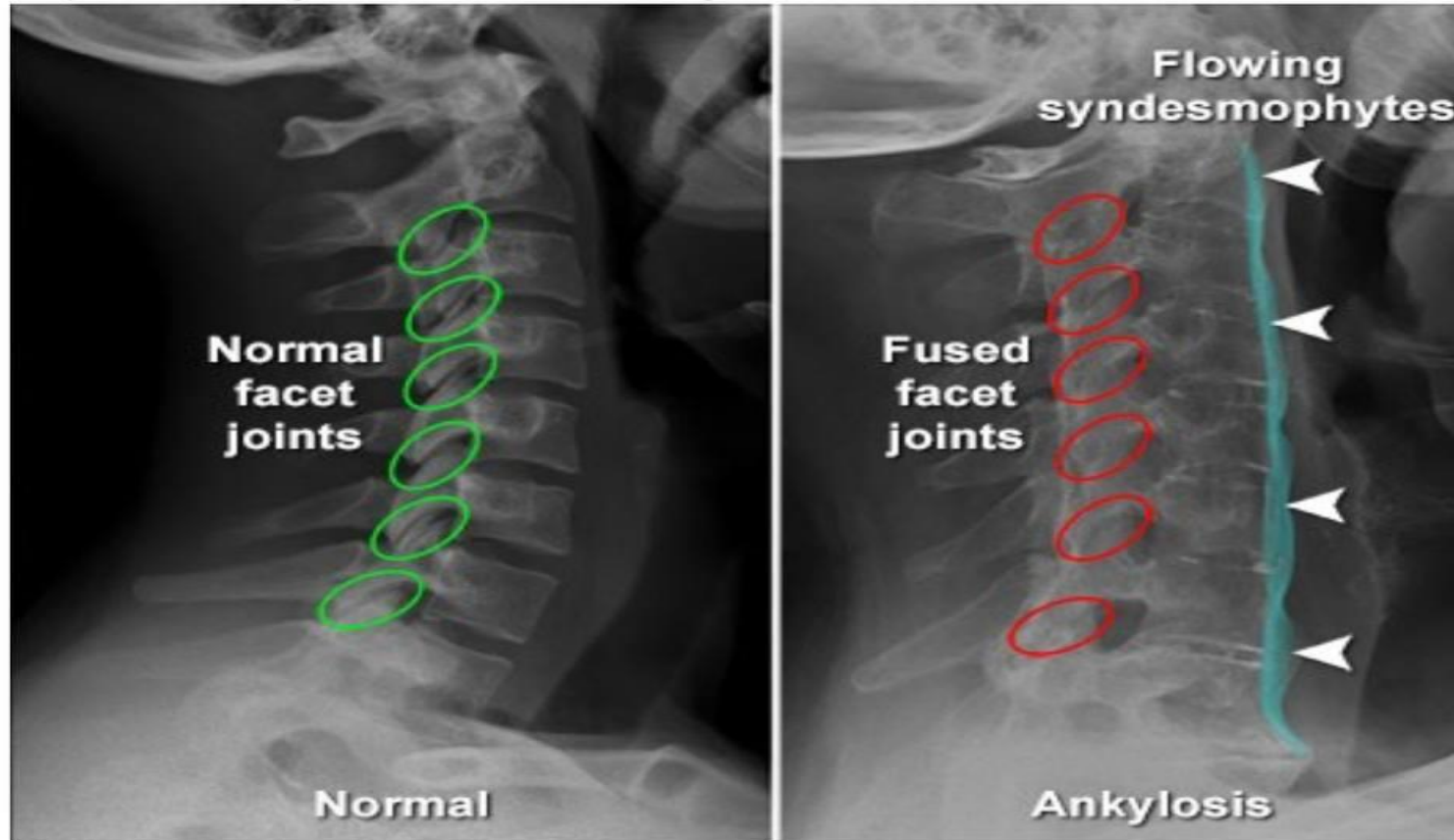
Sacroiliac joint fusion – X-ray

- ◆ Normal sacroiliac joints shown for comparison
- ◆ On the lower image the sacroiliac joints are not visible due to ankylosis (joint fusion)



Ankylosis – Bamboo spine

Tap on/off image to show/hide findings



Ankylosis – Bamboo spine

- ◆ Normal C-spine shown for comparison
- ◆ Flowing syndesmophytes are seen fusing the cervical spine vertebral bodies anteriorly leading to the classic 'bamboo spine' sign – the fused spine resembles bamboo
- ◆ In this patient the facet joints of the spine have also fused

ANKYLOSING SPONDILITIS

-Initial images (pelvis) showed erosions of the right hip joint and

 bilateral sacroileitis that is symmetric

- DDx: AS (favored because of bilateral SI joint disease); Psoriatic

 arthritis, Reiter's syndrome

- Spine image then showed significant **enthesopathy** and development of a

pseudarthrosis

- In the late-stage, the spine is ankylosed (fused), and can break like

 a long bone

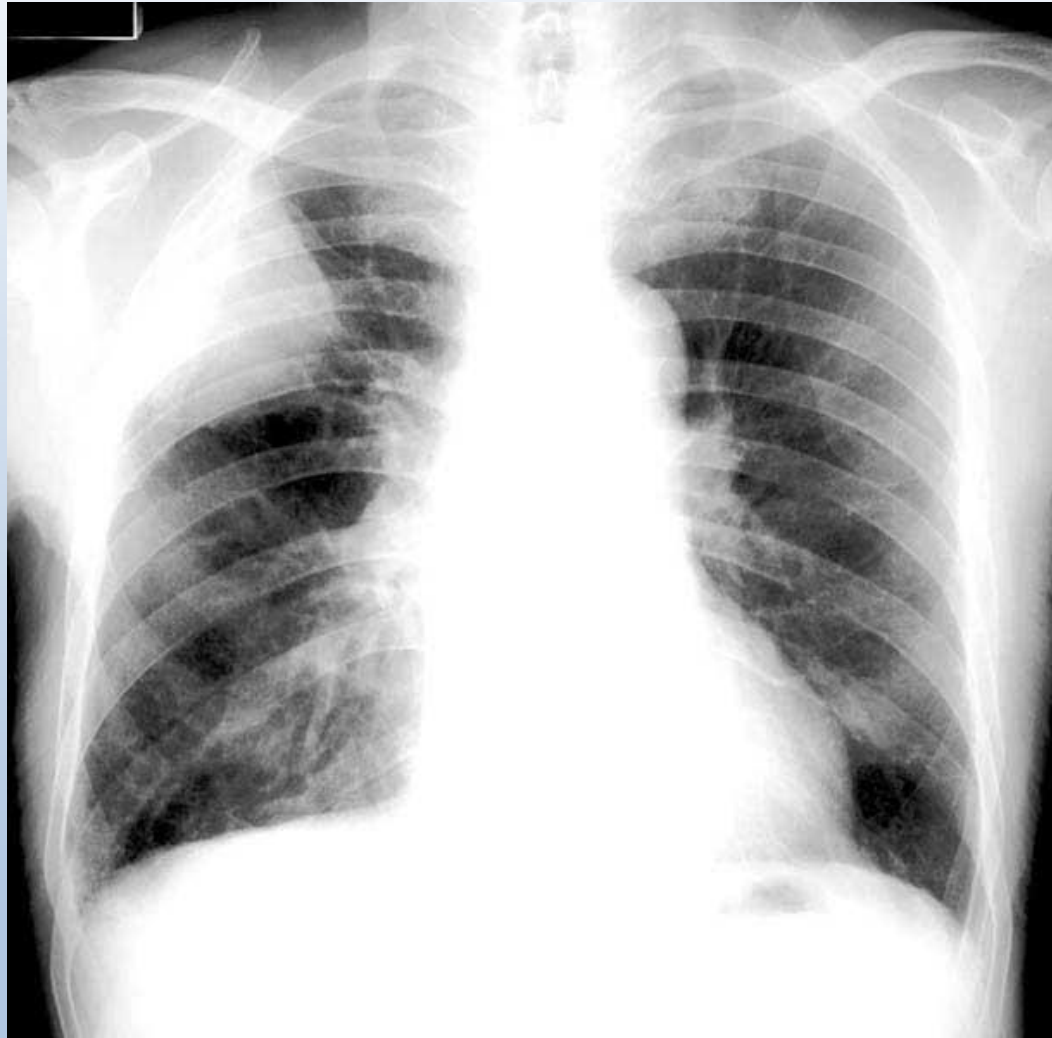


CASE 13

Old male, smoker, cough and arthralgias



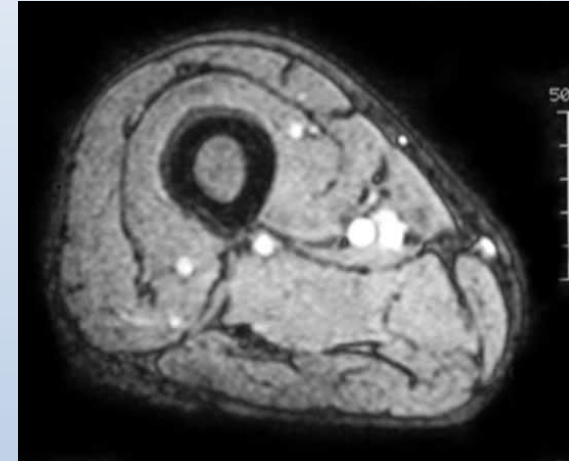




HYPERTROPHIC PULMONARY OSTEOARTHROPATHY

-Initial images showed periosteal reaction along the surface of the tibia; subsequent images showed similar findings in the hands, as well as characteristic increased uptake on bone scan.

- CXR shows a large RUL mass, making pulmonary osteoarthropathy the best choice.



-MR images (above) confirm cortical thickening secondary to periosteal reaction

CASE 14

18 month old , calf pain

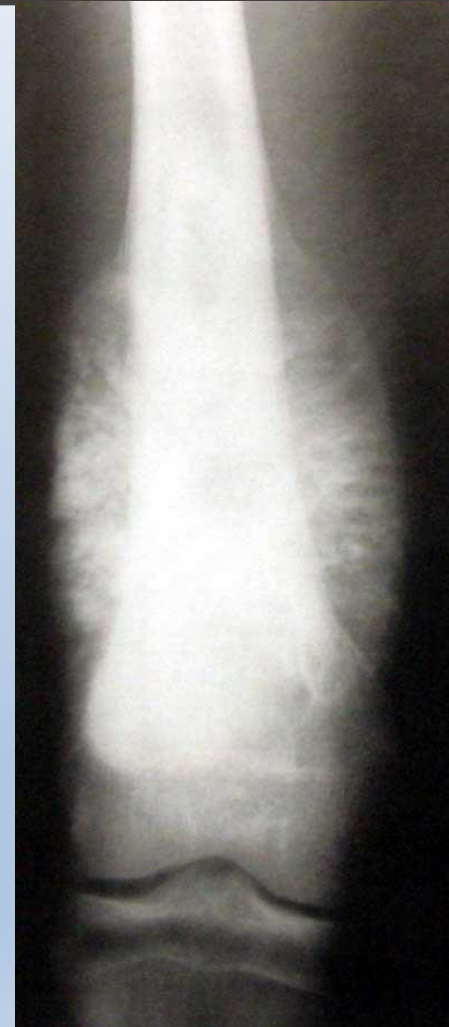


OSTEOSARCOMA

-Initial image showed a highly aggressive lesion in the distal femur, complete with a Codman's triangle, sunburst periosteal reaction, and new bone formation.

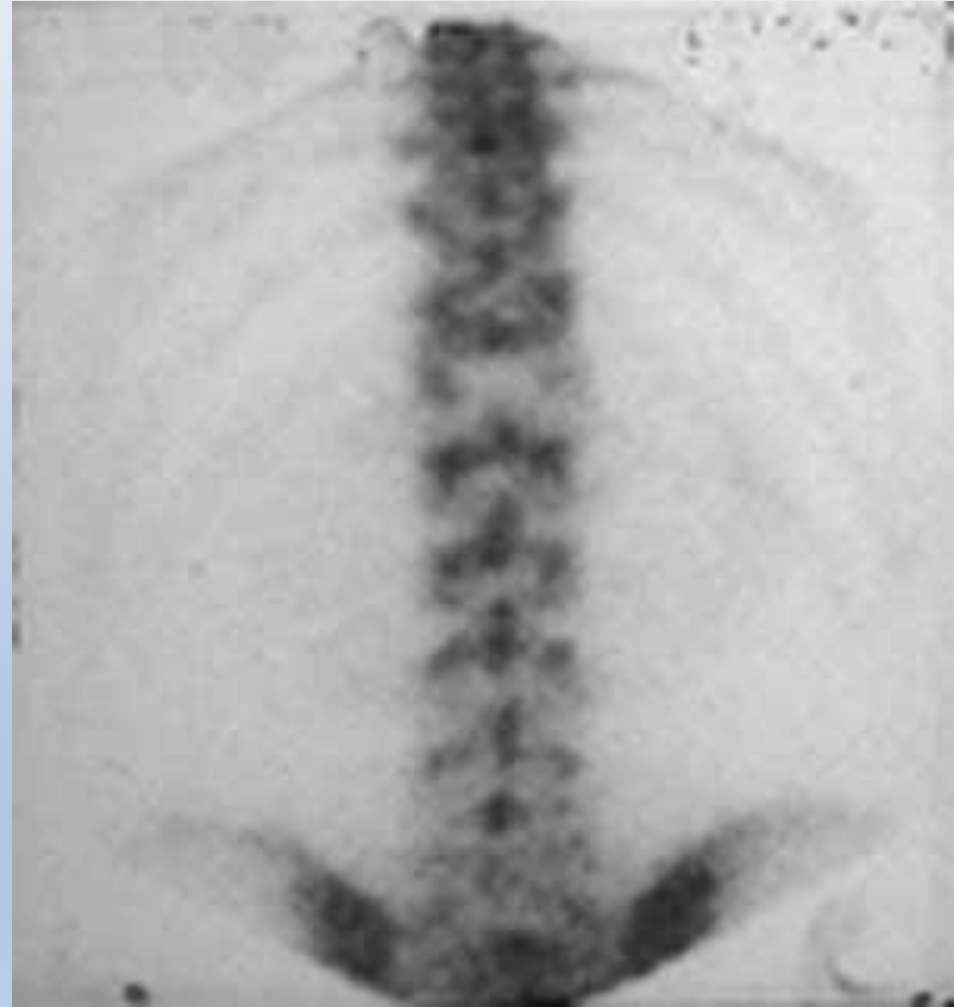
- Bone scan shows (not unexpectedly) intense metabolic activity, and MRI verifies the intra-osseous extent of the tumor.

- DDx: Osteosarcoma, metastasis; less likely Ewing's sarcoma, lymphoma



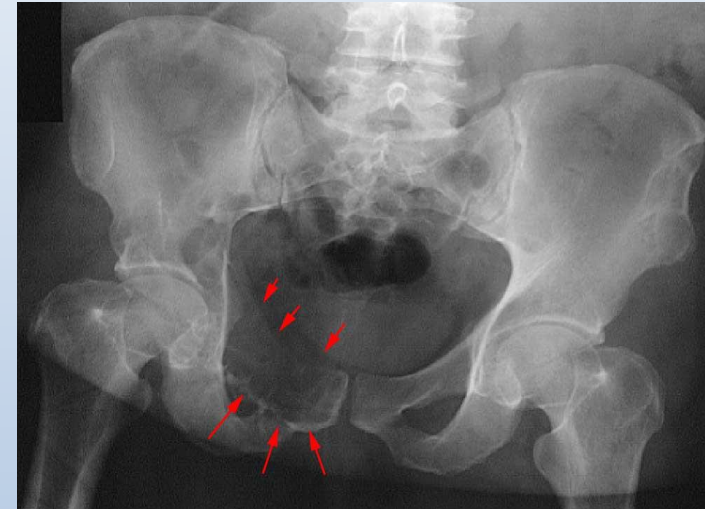
CASE 15

70 year old, neck pain





MULTIPLE MYELOMA



- Initial neck radiograph showed 1 too many spinous processes; the corresponding vertebral body has collapsed = **vertebra plana**
- General DDx for Vertebra Plana: "**MELT**"
Myeloma / **M**etastases; **E**G* / **E**wings; **L**ymphoma / **L**eukemia;
Trauma / **T**B [* EG very unlikely given age!!]
- The cold lesion on bone scan is most consistent with myeloma, and this is borne out by the expansile pelvic lesion & lytic lesions shown



- SAME PATHOLOGY, DIFFERENT PATIENT
- Above images show a more “classic” appearance for a vertebra plana
- Alternative mnemonic: “**FETISH**”
 - F**racture, **E**G, **T**umor (myeloma, lymphoma, leukemia), **I**nfection, **S**teroids, **H**emangioma

CASE 16

35 yo F, s/p fall; ankle pain



Findings, Dx? Any
Further Imaging Needed
/ Recommended?



MAISONNEUVE FRACTURE

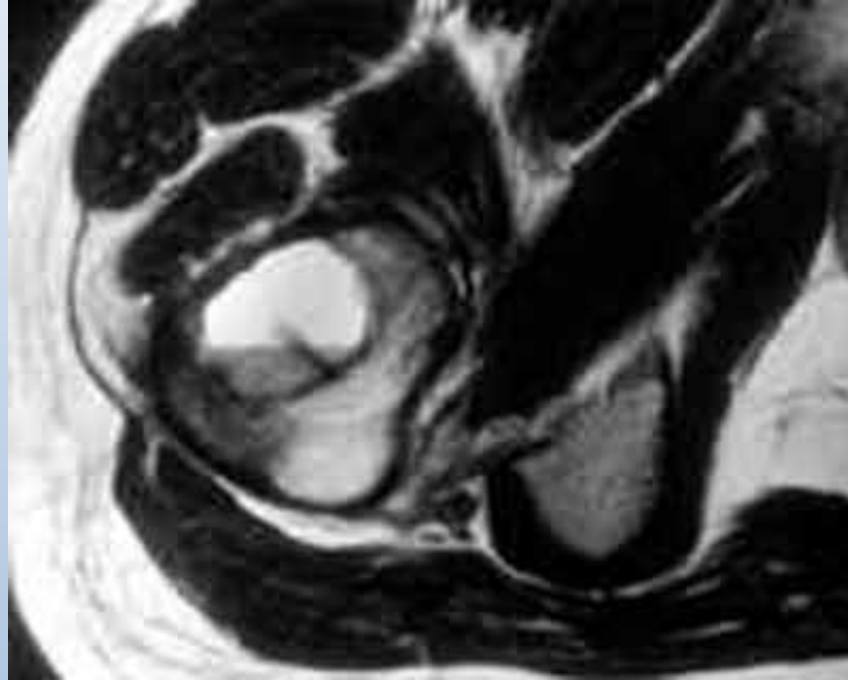


- 1st set of images showed ankle fractures involving the medial malleolus and posterior tibia. However, the widening between the distal tibia and fibula should also be noted (suggests tear of the interosseus membrane).
- Films of the proximal tibia confirm a spiral fracture of the proximal 3rd of the fibula (interosseus membrane is always torn to this point)
- Mechanism: Abduction and External rotation (forces talus laterally against the fibula); distal tibiofibular syndesmosis always ruptured
- Associated with: rupture of the deltoid ligament; one candidate initially shown only widening of ankle joint space

CASE 17



16 year old, ankle sprain

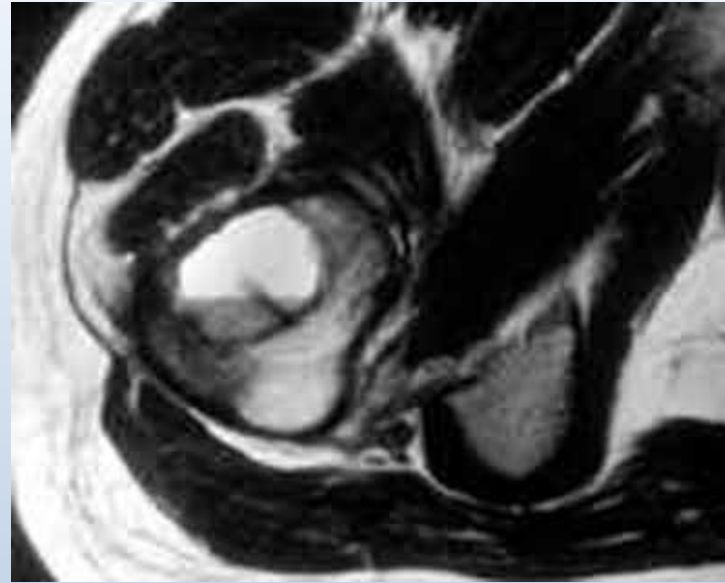


Lesion in
different
patient

SOLITARY (UNICAMERAL) BONE CYST

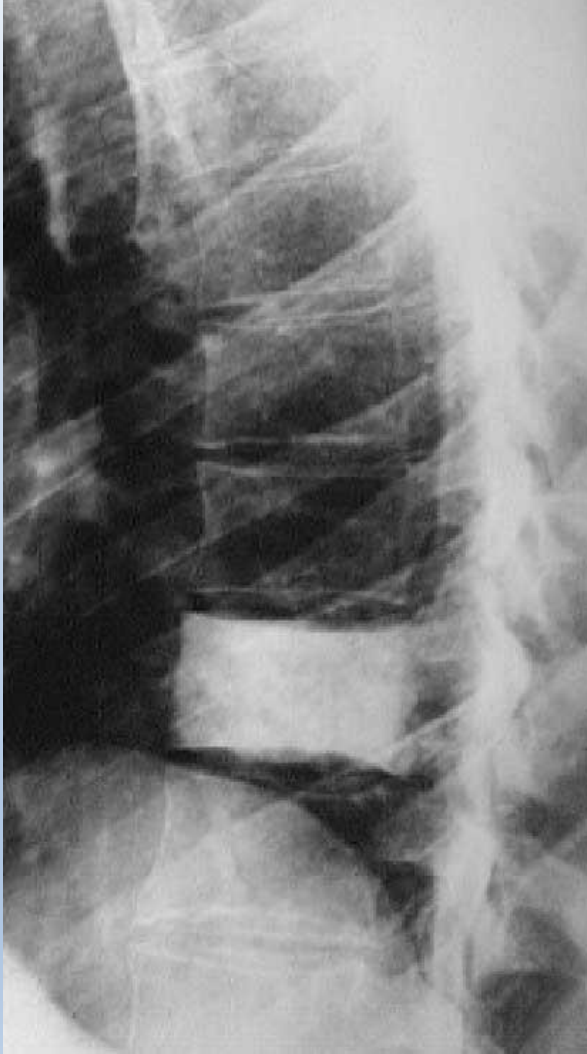


- Film showed a centrally-located, well-marginated lesion in a patient who is under 30 yo. No internal matrix is visible, and the location is “classic” for a Solitary bone cyst.
- **DDx**: intraosseus lipoma, EG, ABC
- 80% of Solitary bone cysts occur in ages 3-19 yo; rare over 30 yo
- **Always** central in location (in any bone)
- Pathological fractures are relatively common (would be a reason to Rx)
- Rx: cortisone injection vs. curettage & marrow transplant

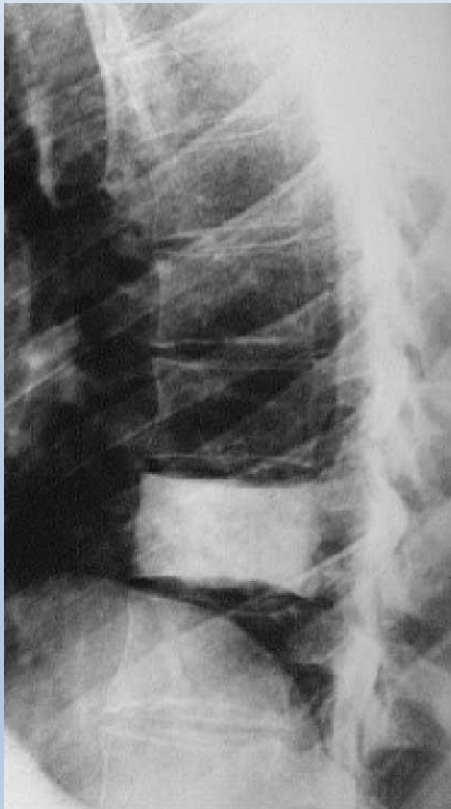


- 2nd case showed the “**fallen fragment**” sign. It is virtually pathognomonic when seen (although only occurs in 20%)
- MRI demonstrates the fluid-filled nature of this lesion, and also shows a fluid-fluid level (DDx: Aneurysmal Bone Cyst)
- The MRI also seems to confirm the intra-cyst “fallen fragment”
- Bone scan would show a photopenic area (unless fractured)
- Multiple theories on etiology: ? Trauma, ? Vascular anomaly

CASE 18



IVORY VERTEBRAE



DDx for Ivory Vertebra: “**LOST FROM CHOMP**”

Lymphoma,

Sickle cell disease,

Fluorosis,

Osteoblastic metastasis, Myelosclerosis,

Chronic sclerosing osteomyelitis / chordoma, Hemangioma,

Osteosarcoma,

Osteopetrosis,

Trauma/Tuberculous spondylitis,

Renal osteodystrophy,

Myeloma,

Paget's disease

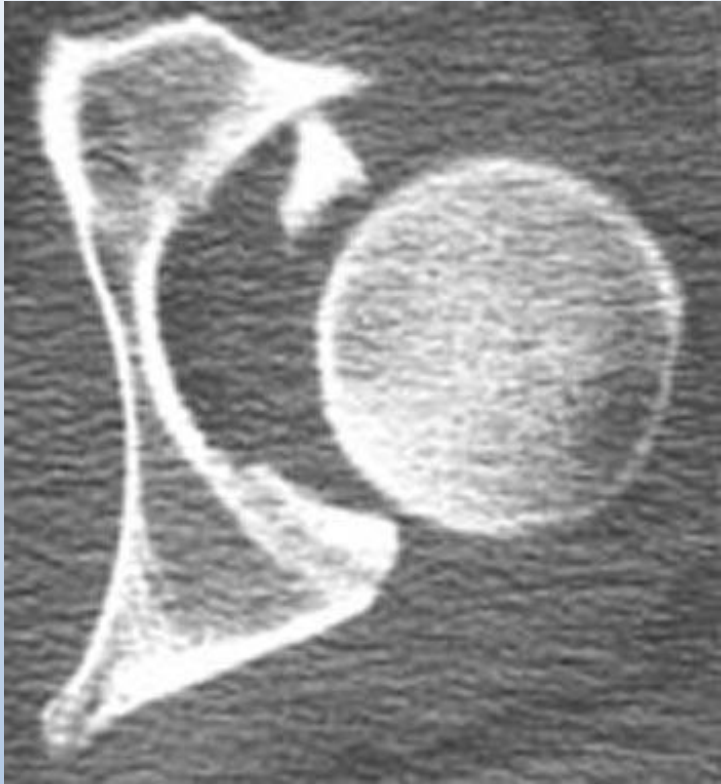
CASE 19

38 YO, POST- RTA



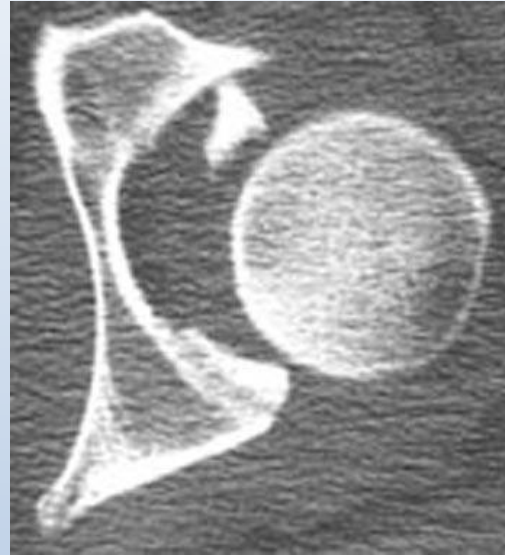


Post reduction film
Next step??



Findings, significance??

POSTERIOR HIP DISLOCATION

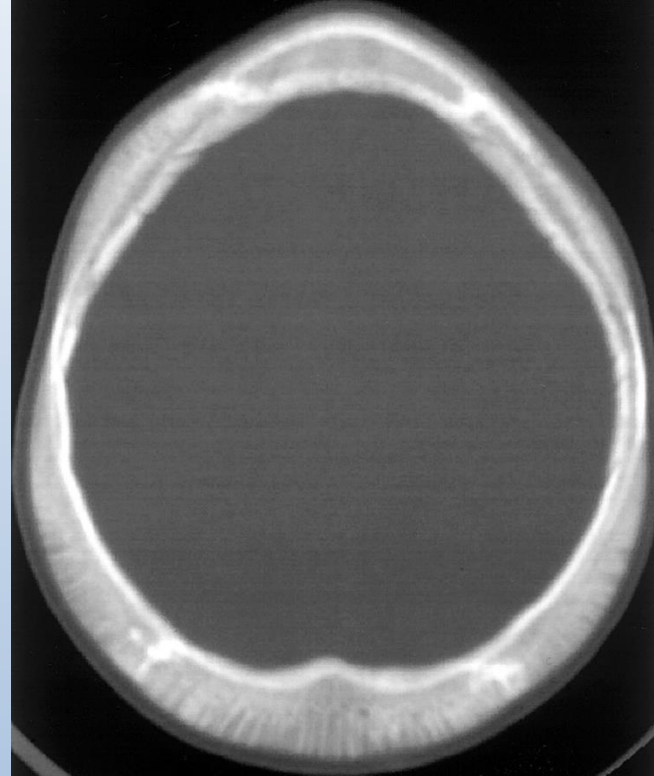
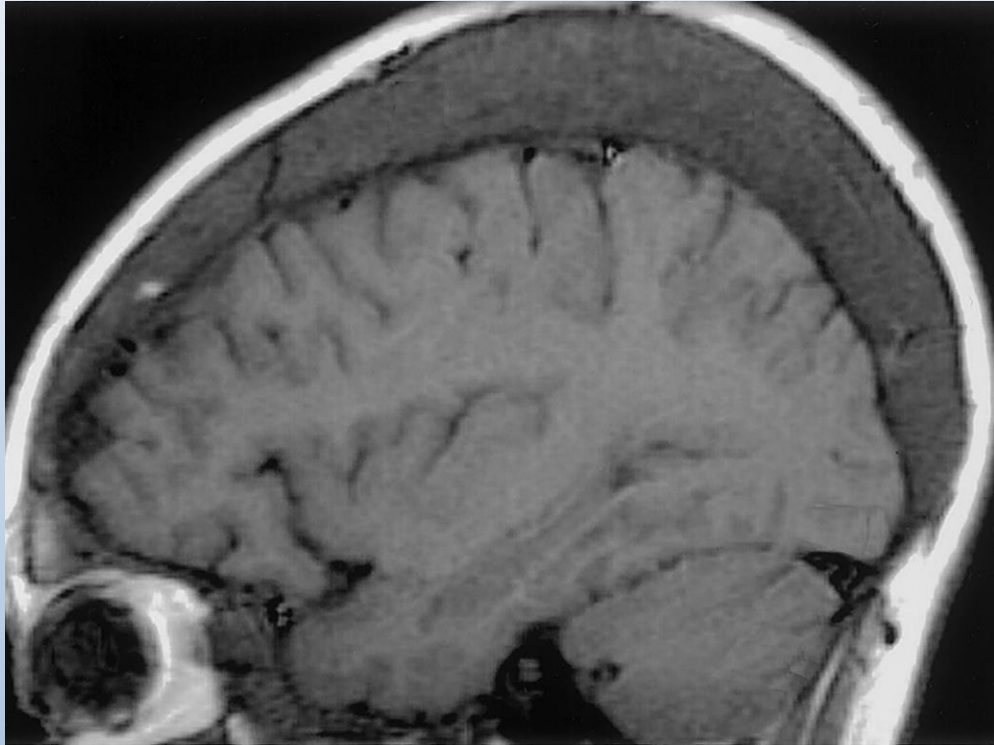


- Initial radiograph shows a posterior hip dislocation, subsequently relocated.
- However, CT allows one to see a fracture of the posterior rim of the acetabulum, which is subsequently trapped within the joint space
- The posterior hip dislocation is the most common type of hip dislocation (80-85%). Classically associated with the knee striking the dashboard in an MVA (also associated with femur Fx)
- An acetabular fracture with a trapped fragment in the joint will require **operative** management—this is why CT is mandatory

CASE 20

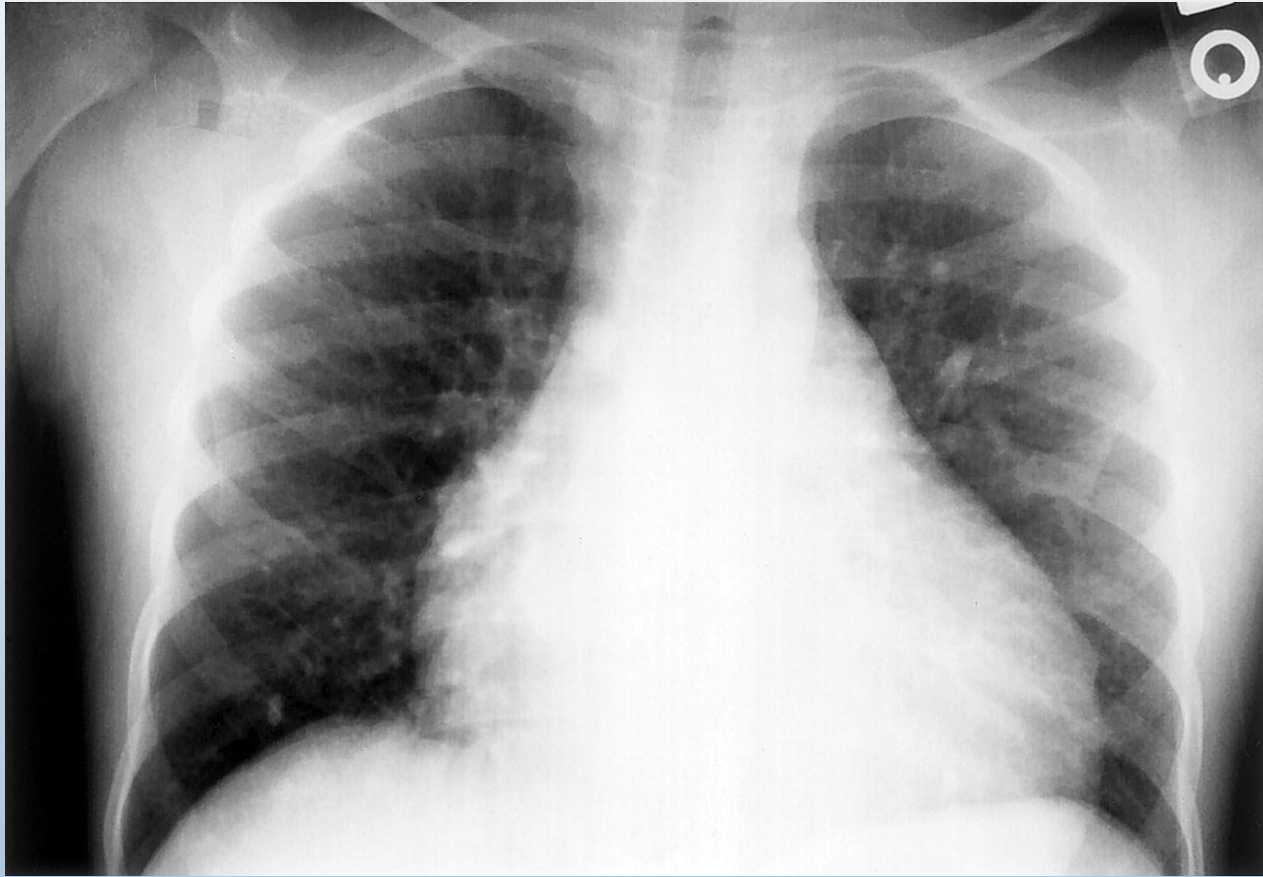


8 month old,
irritable.

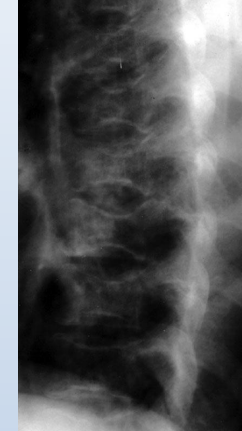
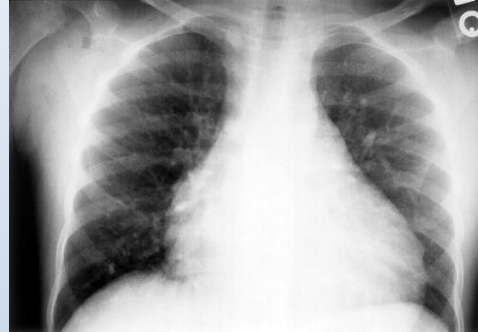
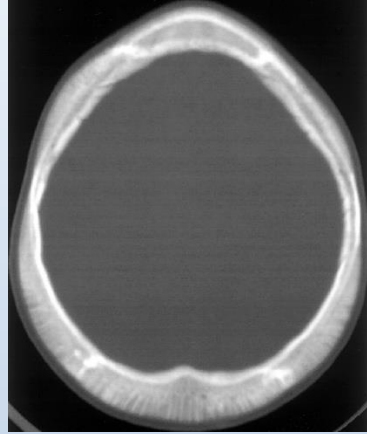








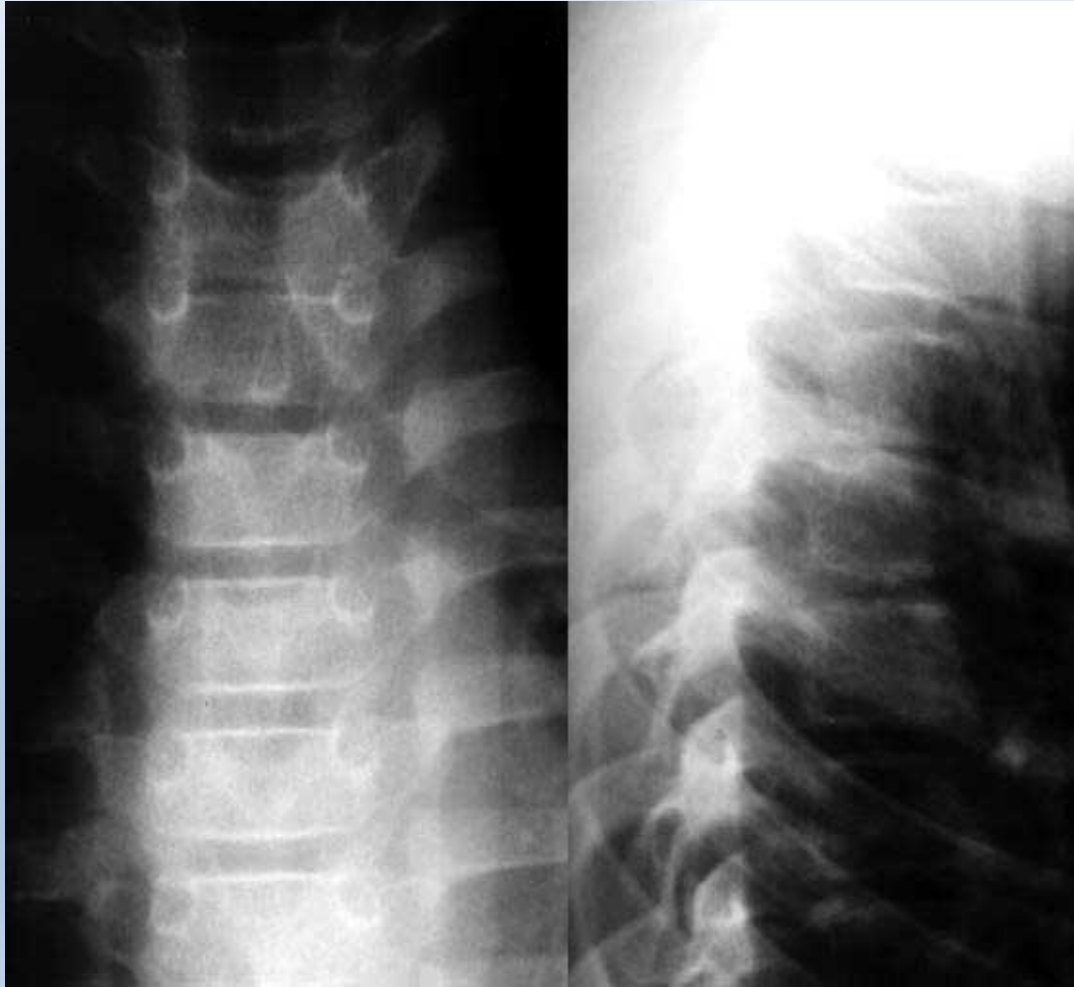
SICKLE CELL ANEMIA



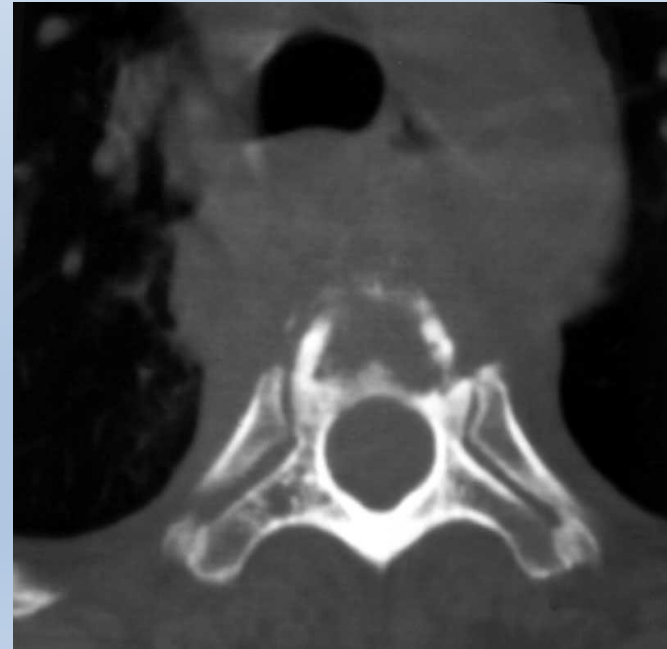
- Hand & Foot films showed soft-tissue swelling and periosteal reaction, consistent with sickle-cell dactylitis (hand-foot syndrome)
 - * DDx at this point: early Juvenile Rheumatoid Arthritis
- MRI / CT showed expansion of the diploic space in the skull
- The spleen was small and calcified, and had uptake of MDP
- There was AVN of the femoral heads, and an enlarged heart from the chronic anemia
- Lateral spine film showed "Lincoln-Log" vertebrae, which are classic for sickle cell disease

CASE 21

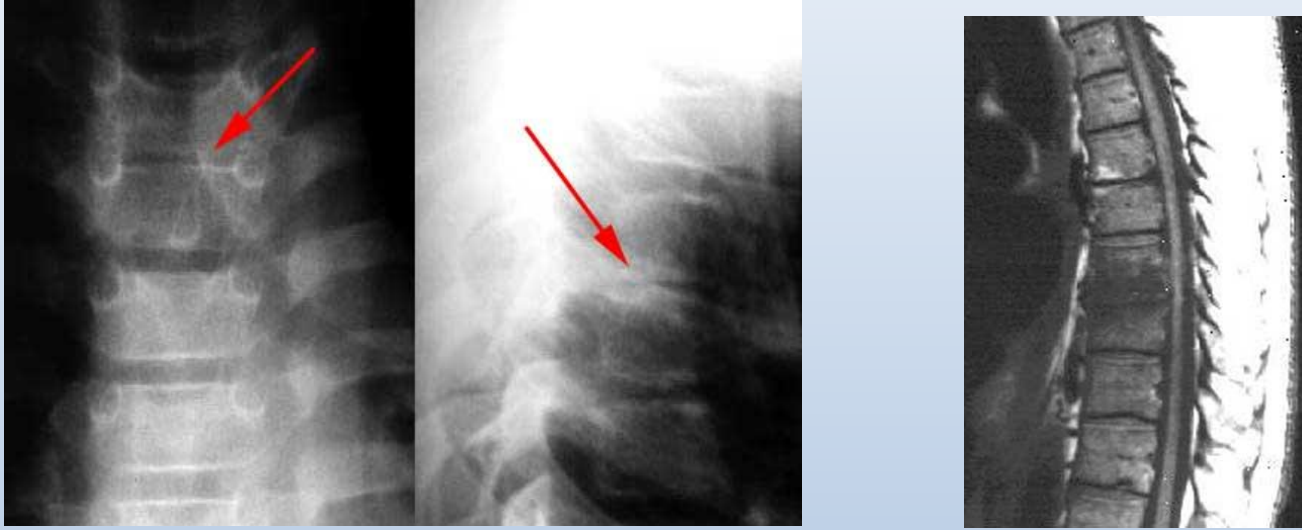
8 year old, back pain ,
fever



Different patient, similar
pathology



INFECTIOUS DISKITIS



- Initial radiographs were remarkable mainly for narrowing of the intervertebral disc space in the upper thoracic spine.
- MRI confirmed obliteration of the disc space with edema extending into the surrounding vertebral bodies, consistent with diskitis
- Final images (separate case) showed an epidural abscess as well as a paraspinal mass, suggestive of Pott's disease (tuberculosis)

THANK YOU