

# Orthopedics

5th year- university of jordan

Final past papers



V2: Q 2 p.73  
Q16 p.173

2025

Q1-Which of the following is most important for stability of ankle fractures?

A. ATFL

B. Syndesmosis

C. Deltoid ligament

D. PTFL

Answer: B

#### Type A

- **Below** level of the ankle joint
- Tibiofibular **syndesmosis intact**
- Deltoid ligament intact
- Medial malleolus often fractured
- Usually stable



#### Type B

- **At the level** of the ankle joint
- Syndesmosis intact or partially torn
- No widening of distal tibiofibular articulation
- Medial malleolus may be fractured
- Deltoid ligament may be torn
- Variable stability



#### Type C

- **Above** the level of the ankle joint
- **Syndesmosis disrupted**
- Widening of distal tibiofibular articulation
- Medial malleolus fracture
- Deltoid ligament injury
- Unstable (requires ORIF)



## Classification and treatment

- Danis-Weber

It classifies lateral malleolus (fibular) fractures based on where the fracture line sits relative to the **ankle syndesmosis**

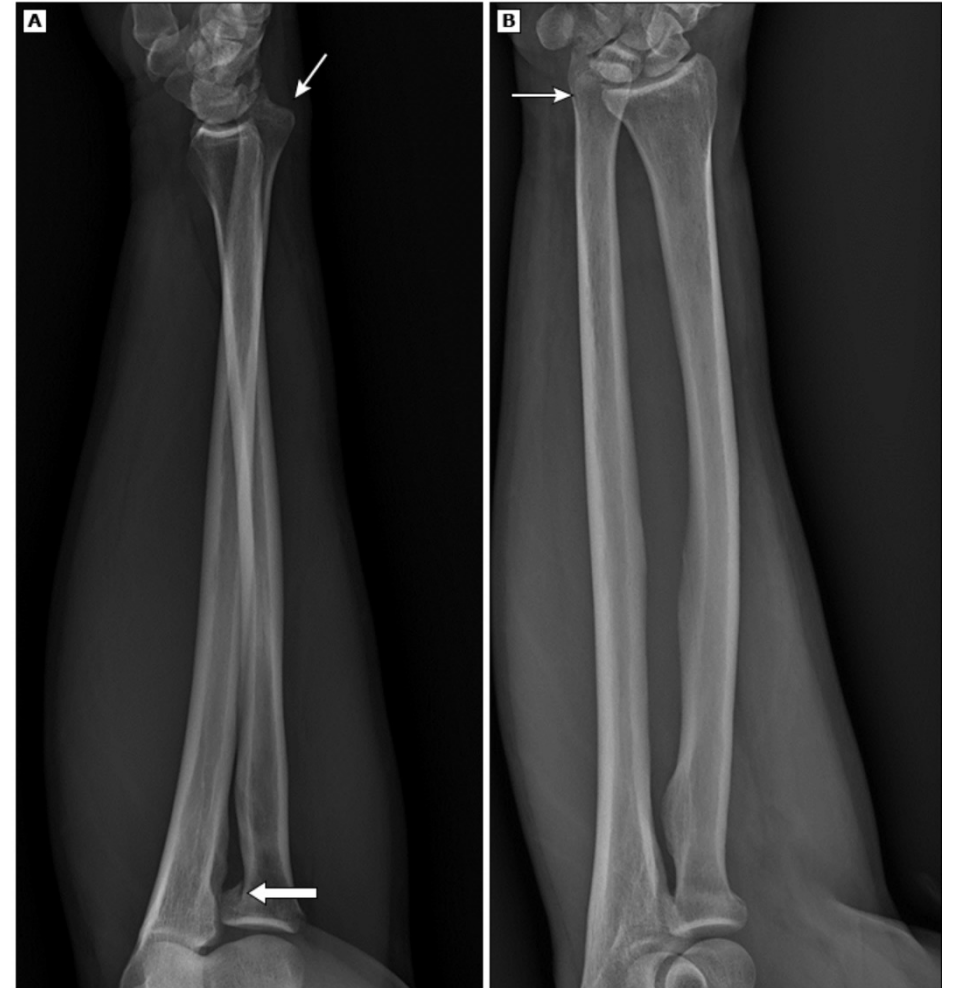
Q2- Which of the following considered a pitfall in clinical examination of comminuted radial head fracture?

- A. AP and lateral elbow X-ray
- B. Elbow CT
- C. Elbow MRI
- D. Ulnar nerve evaluation
- E. Examining the distal radioulnar joint DRUJ

Answer : E

This type of fractures is called **Essex-Lopresti** , which is a combination of three injuries :

1. Radial head fracture
2. Disruption of the interosseous membrane
3. Instability of the DRUJ [next slide](#)



Prompt diagnosis is **the primary challenge** with Essex-Lopresti injuries. Early diagnosis depends on the clinician being aware of the injury pattern and evaluating for instability of the interosseous membrane and DRUJ whenever a radial head fracture is identified. **UpToDate**

The question is **not asking** “Which of these are useful or correct?”  
It’s asking: **Which important thing is commonly missed? =pitfall**

Q3-RTA and the patient skin has contacted the soil, penicillin was added, which organism is covered by penicillin in open fx contaminated by soil?

- A. Staph. Aureus
- B. Strep
- C. Pseudomonas
- D. Clostridium
- E. Mycobacterium

Answer: D

Anaerobes from the soil → clostridium

Q 4. A patient falls in his hand and Xray showed transverse fracture of the head of humerus and treated with **compression plate**, what do you expect to see after 3 months on xray?

- A. Non united with callus
- B. United with callus
- C. Healed without callus
- D. Atrophy of edges

Answer: c

**Compression plates**  $\Rightarrow$  Absolute stability  $\Rightarrow$  primary bone healing  $\Rightarrow$  no calus formation

Absolute stability achieved by :

1. Lag screws
2. Compression plates
3. Tension band wiring

Q5. ligament injured if varus stress test is positive at 0° and 30°?

A. ACL

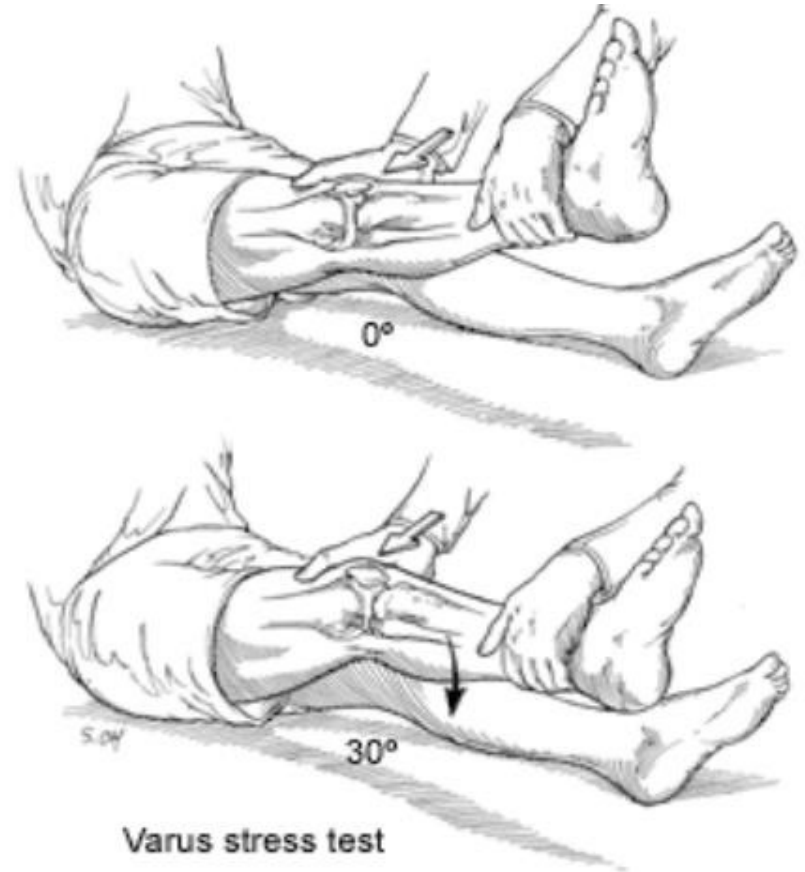
B. LCL

C. ACL+ LCL

D. MCL

Answer : c

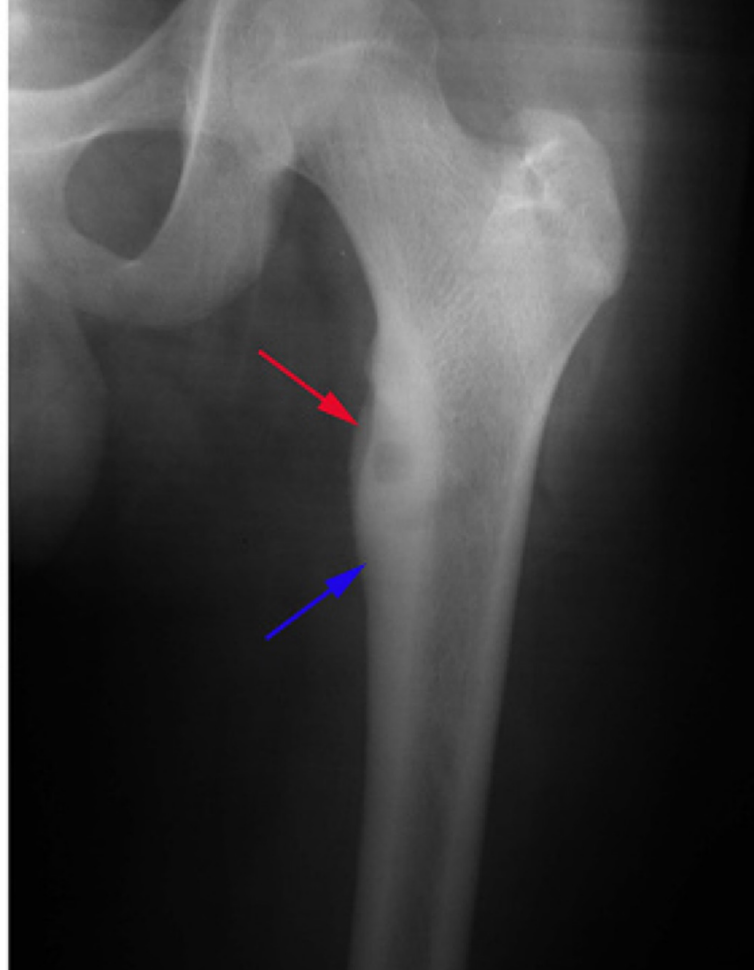
- Varus stress test at  $30^\circ$   $\Rightarrow$  isolates the LCL.
- Varus stress test at  $0^\circ$   $\Rightarrow$  tests the entire lateral side, including LCL, ACL, and posterolateral structures.



Q6. picture of tumor sclerotic with nidus relieved by NSAID?

- A. Osteoid osteoma
- B. Osteosarcoma
- C. Chondroma
- D. Fibrous dysplasia

Answer : a



## Osteoid Osteoma

- A completely benign lesion that can occur anywhere in the bone.
- Note the small well defined lytic lesion (nidus) surrounded by thick sclerosis.
- Presents with pain especially at night. It responds to NSAID's but not paracetamol.
- This is explained by the release of prostaglandins from the tumor.
- The inflammation also explains the reactive sclerosis.

Q7- which test is related to complete external rotators tear?

A. Hawkins

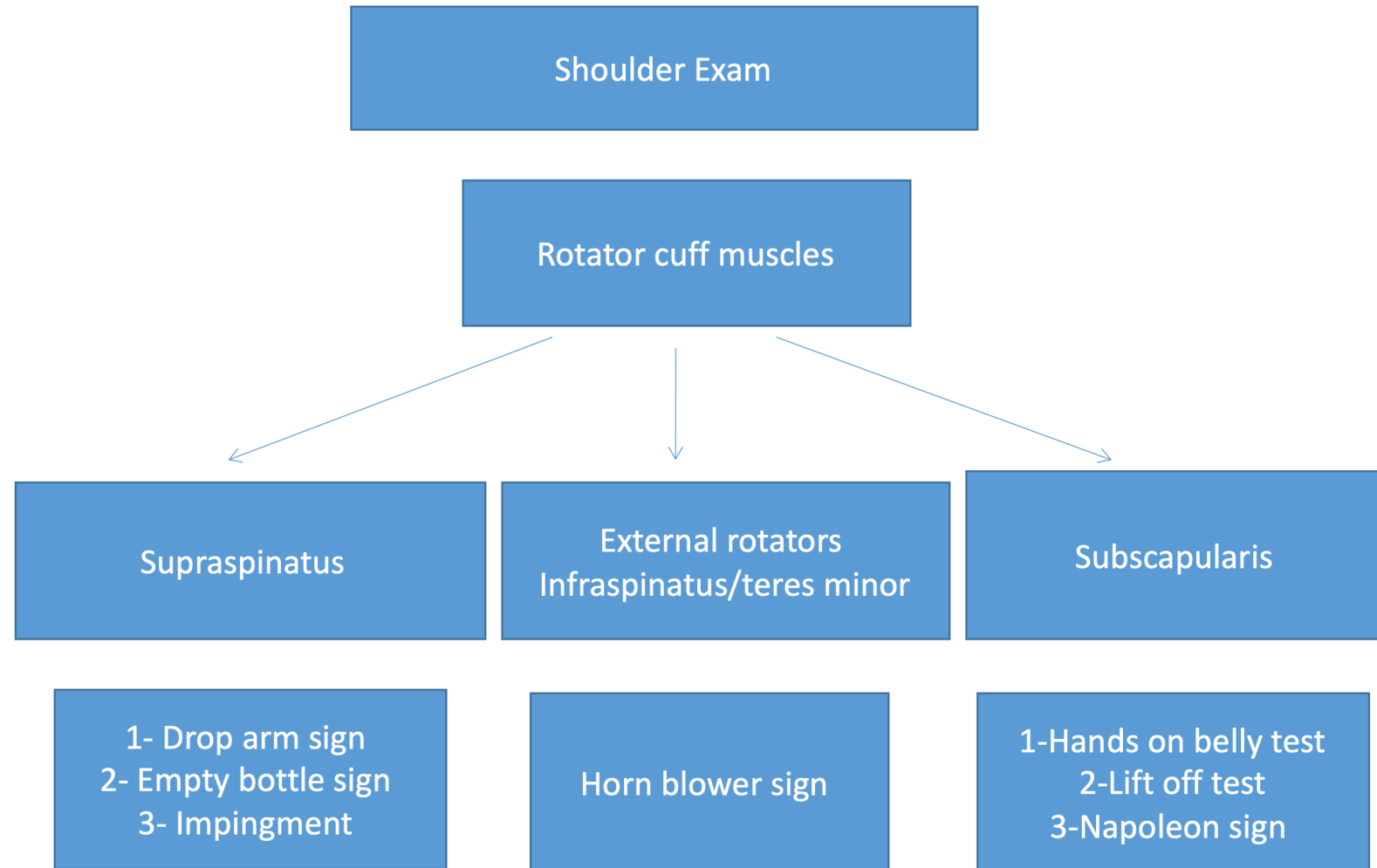
B. Horn blower

C. Arm drop

D. Napleon

E. Empty can test

Answer: b



Q8- 14 year old child with knee pain , Xray of the hip showed moderate severity SCFE, what is the best next step in management ?

- A. Reassurance and walking crutches
- B. Screw fixation without reduction
- C. ORIF
- D. Discharge with analgesia

Answer: b

### **Treatment**

The primary goals of management are stabilization of the slip to prevent further progression and promotion of physeal closure.

### **Surgical treatment :**

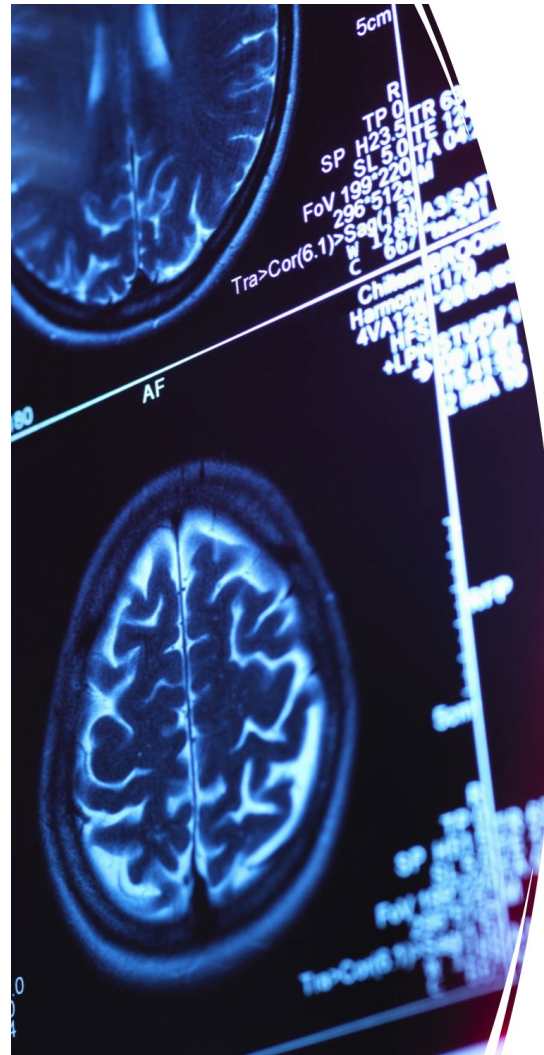
In situ screw fixation is the preferred initial treatment of SCFE.

NO manipulation for reduction because it is associated with AVN

Q9- 75 male patient with a sclerotic fracture, what is the most likely origin of the primary cancer?

- A. Prostate cancer
- B. Lung cancer
- C. Bladder cancer
- D. Thyroid

Answer : a



## Secondary Tumors (Metastases)

- More common than primary lesions.
- Occur mainly after the fifth decade.
- Usually in the axial skeleton.
- Most commonly from:
  - Lung: lytic lesions, can occur distal to the knee or elbow, poor prognosis.
  - Breast: mixed lesions, relatively good prognosis.
  - Prostate: sclerotic lesions, good prognosis.
  - Kidney: lytic hypervascular lesions.
  - Thyroid: poor prognosis.

Q10- what supplies deltoid?

A. Radial

B. Ulnar

C. Long thoracic

D. Axillary

Answer : d

11- Best imaging modality to diagnose osteoporosis?

A. X-ray

B. CT

C. DEXA

Answer : c

12- which of the following mimics shoulder septic arthritis ?

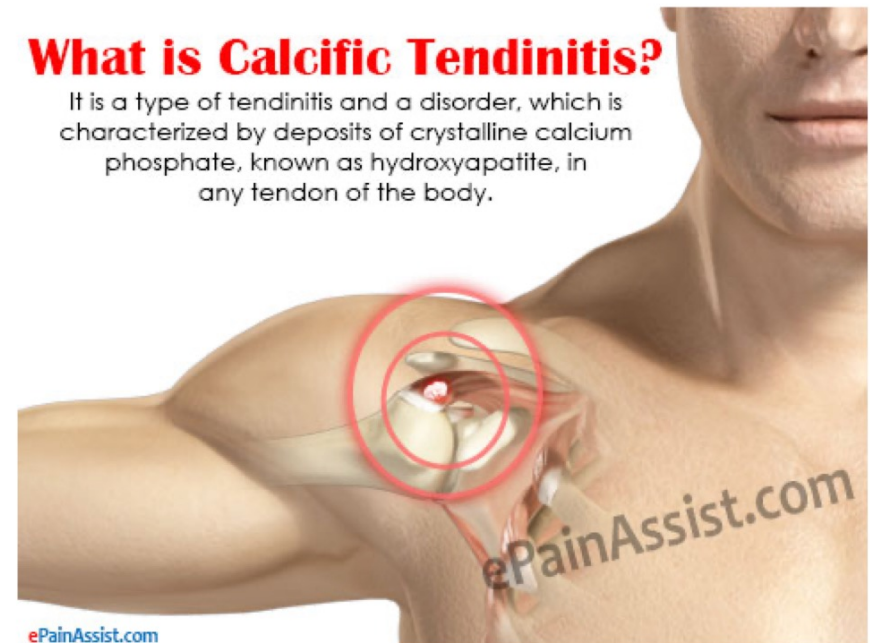
- A. Acute rotator cuff tear
- B. Acute calcific tendinitis
- C. Subacromial bursitis
- D. Impingement syndrome
- E. Biceps tendinitis

Answer : b

Presentation of calcifying tendonitis :

1. Sudden, severe shoulder pain
2. Markedly limited range of motion
3. Swelling, warmth, sometimes even mild fever
4. Elevated inflammatory markers

## Calcifying tendonitis



Q13- Rehab ques (2 weeks after no muscle movement?)

A. Spasticity

B. Rigidity

C. Mechanical

D. Flaccid paralysis

E. Inflammation

Answer: d

After 2 weeks of no voluntary muscle movement (e.g., following a stroke) the affected muscles typically **become flaccid** initially.

- Flaccid paralysis  $\Rightarrow$  loss of muscle tone, absent reflexes, and weakness.
- Spasticity  $\Rightarrow$  develops later, usually after 1–6 weeks, as part of the **UMN lesion** evolution.
- Rigidity  $\Rightarrow$  associated with **basal ganglia** disorders, not acute paralysis.
- Mechanical  $\Rightarrow$  refers to joint or tissue restrictions.
- Inflammation  $\Rightarrow$  may cause pain/swelling.

So in early rehab, muscles are initially flaccid before spasticity sets in.

Q14- Which one is the correct match?

A. Ulnar nerve- Ok sign.

B. Ulnar nerve- hypothenar atrophy.

C. Median nerve- froment's test.

D. Radial nerve – thenar atrophy.

E. Radial nerve- Wartenburg's sign.

Answer: b

**Ulnar nerve:** Hypothenar atrophy, claw hand, Froment's sign, Wartenburg's sign.

**Median nerve:** Thenar atrophy, difficulty with thumb opposition, OK sign (anterior interosseous branch).

**Radial nerve:** Wrist drop, finger extension weakness, sensory loss over dorsal hand.

Q15. Carpenter complain of pain in flexion of the knee and medial joint line tenderness, knee xray showed joint space narrowing? Best management

Weight reduction+ paracetamol (osteoarthritis)

Q 16- Bilateral ddh at the age of 3, will show ?

Wide perineum (next slide)

***DDH In toddlers, (+after walking): (important !)***

1. Wide perineum in **bilateral** DDH
2. Lumbar lordosis in **bilateral** DDH
3. Trendelenburg's sign and gait.
4. Limping in **unilateral** DDH
5. LLD in **unilateral** DDH

Q17- Sign of severe CTS:

- A. Paresthesia
- B. Can't handle her bag
- C. Can't tie button of the shirt
- D. History of Diabetes

Answer: b

Signs & symptoms of severe carpal tunnel syndrome:

1. Thenar atrophy /wasting.
2. Tinel sign within 3-seconds.
3. Motor deficit & weakness.
4. Nerve conduction studies indicate severity. [Dr.Aws's lecture notes](#)

❖ B vs C? think about it as the more **difficult** it is to perform a **simple task** ( the ability to grip objects), the more severe the CTS.

Q 18- Gastrocnemius and soleus muscles are most **eccentrically** contracted in what phase ?

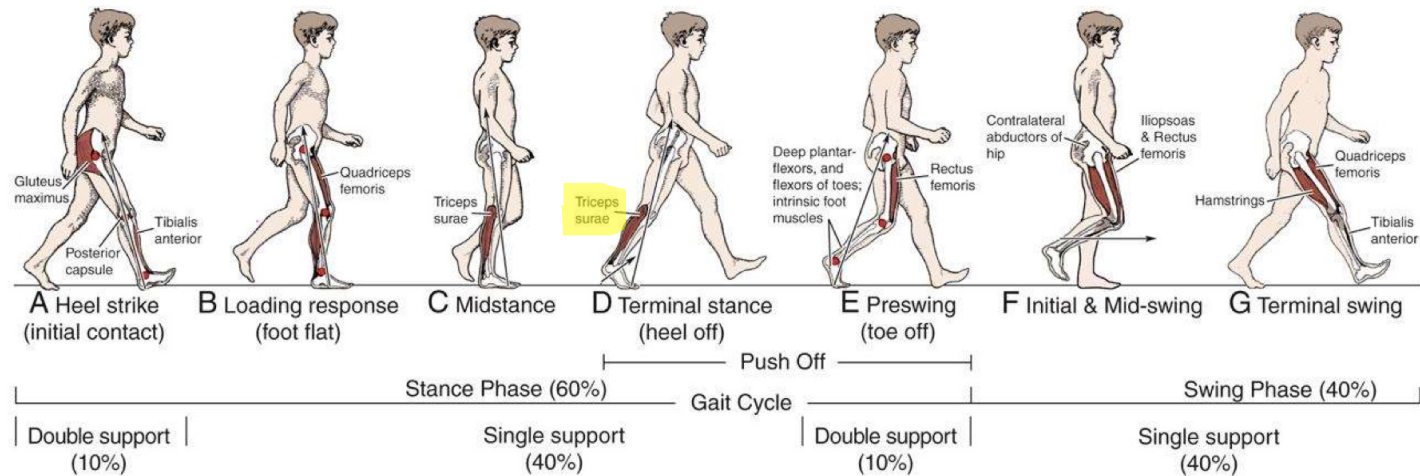
- A. Initial stance
- B. Loading response
- C. Mid-stance
- D. Terminal stance
- E. Pre-swing

Answer: c

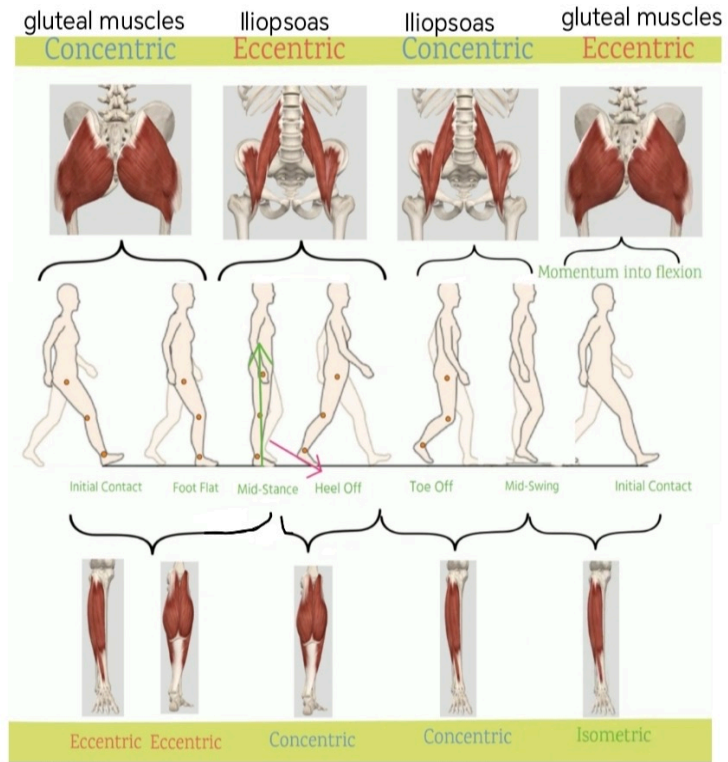
## Concentric VS Eccentric:

Concentric : Muscle **shortens** while generating force.

Eccentric : Muscle **elongates** while still generating force.



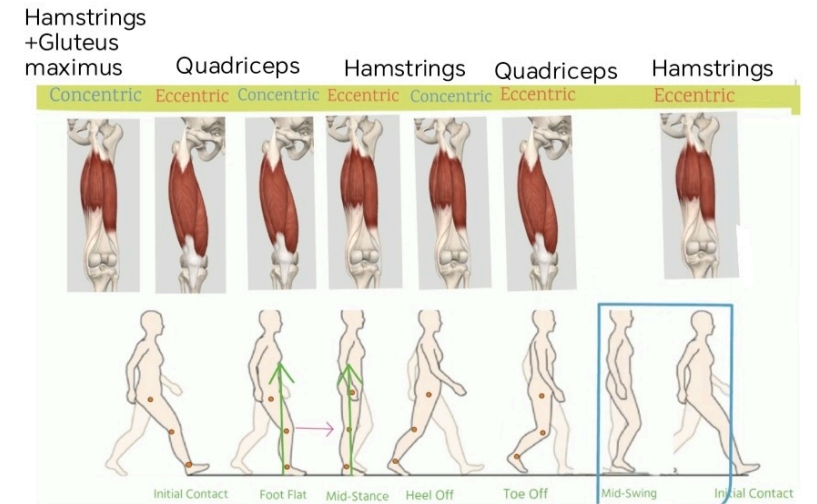
At the hip joint



At the ankle joint

tibialis anterior Gastrocnemius + Soleus tibialis anterior tibialis anterior

At the knee joint



Q19- The most common cause of lower back pain that is more severe at **extension**?

- A. Muscular pain
- B. Lumbar canal stenosis
- C. Disc herniating
- D. Facet joint arthropathy

Answer: b

Physical Exam:

- Look
  - Deformity , can be seen in muscle spasm or disc prolapse and if it's found it indicates significant pathology but its absence doesn't exclude them.
  
- Feel
  - Interspinal area (to palpate discs and determine the affected segments)
  - Landmark: iliac crest L4/L5 → pain or tenderness could be above or below it.
  - Paraspinal muscles. The patient might avoid the pain by GUARDING which is muscle spasm (feel if the muscle is tensed, if the muscle is relaxed you can tell that the pain isn't that severe) → Malingering effect.
  - Palpation of interspinous spaces for ligament pathology or paraspinal for muscles if both are tender think of Disc prolapse
  
- MOVE
  - Range of movement
  - In disc prolapse the pain increases with flexion and it's relieved with lying down (which decrease intradiscal pressure → decrease protrusion)
  - Muscle spasm pain also increases with flexion.
  - In spondylolisthesis the pain is worse with extension
  - In spinal canal stenosis → increases with extension, relieved by flexion

Q20- Ulnar nerve injury, unable to do:

- A. Finger abduction
- B. Wrist extension
- C. Wrist flexion
- D. Thumb abduction

Answer : A

Ulnar nerve innervates the **intrinsic muscles of the hand**, particularly the **interossei muscles**.

- Finger abduction ⇒ Ulnar nerve
- Wrist extension ⇒ Radial nerve
- Wrist flexion ⇒ Median nerve
- Thumb abduction ⇒ Median nerve

Q 21- Picture of rocker bottom feet Which of the following is true about this deformity?

- A. talonavicular dislocation
- B. better prognosis than club foot
- C. treatment is primarily surgical
- D. usually unilateral

Answer: A

### **Congenital vertical talus (Rocker-bottom foot):**

- Irreducible dorsal dislocation of the **navicular on the talus** producing a rigid flatfoot deformity:
  - Irreducible dorsolateral navicular dislocation
  - Vertically oriented talus
  - Calcaneal eversion with attenuated spring ligament
- Soft tissue contractures:
  - Displacement of peroneal longus and posterior tibialis tendon so they function as dorsiflexors rather than plantar flexors
  - contracture of the Achilles tendon
- **Worse prognosis than club foot.**
- Treatment by serial casting (reverse ponseti) and a small surgical procedure is needed before applying the last cast



Q 22. Which of the following is true about clubfoot?

- A. It is detected in utero as early as 8 weeks
- B. Surgical treatment is usually indicated or needed
- C. True clubfoot is flexible and stretching is enough
- D. Recurrence rate is high without Ponseti Casting

Answer: D

Recurrence is high without proper Ponseti treatment and long-term bracing compliance.

- Clubfoot deformity can be detected on prenatal US as early as **16 weeks**, but nothing can be done. (answer A)
- Golden method of treatment is **Ponseti Casting**. (Answer B)
- True clubfoot ( pahologic) is **regid** and structurally deformed. (Answer C)

Q 23. A 50-year-old man with **hyperparathyroidism** had pain after minor fall on a step, that resulted in **limitation in knee extension** which of the following extensor mechanism was affected:

- A. Quadriceps muscle
- B. Quadriceps tendon
- C. Patella
- D. Patellar tendon

Answer: b

Think weakened collagen,  
impaired healing, or  
abnormal  $Ca^{2+}/PO_4^{3-}$   
metabolism.

### Quadriceps Tendon Rupture:

- usually at insertion of tendon to the patella
- M > F / > 40 years of age
- nondominant limb > dominant

#### Risk factors :

renal failure / diabetes / RA hyperparathyroidism / CTD / steroid use

#### Treatment

- knee immobilization in brace
- primary repair with reattachment to patella

### Patella Tendon Rupture

- sudden quadriceps contraction with knee in a flexed position
- most commonly in 3rd and 4th decade
- male > female

**risk factors:** SLE • RA • CKD • DM • corticosteroid injection

**Symptoms:** infrapatellar pain / popping sensation

#### PE:

- elevation of patella height
- large hemarthrosis and ecchymosis
- palpable gap below the inferior pole of the patella
- unable to perform active straight leg raise
- reduced ROM of knee ...extensor lag

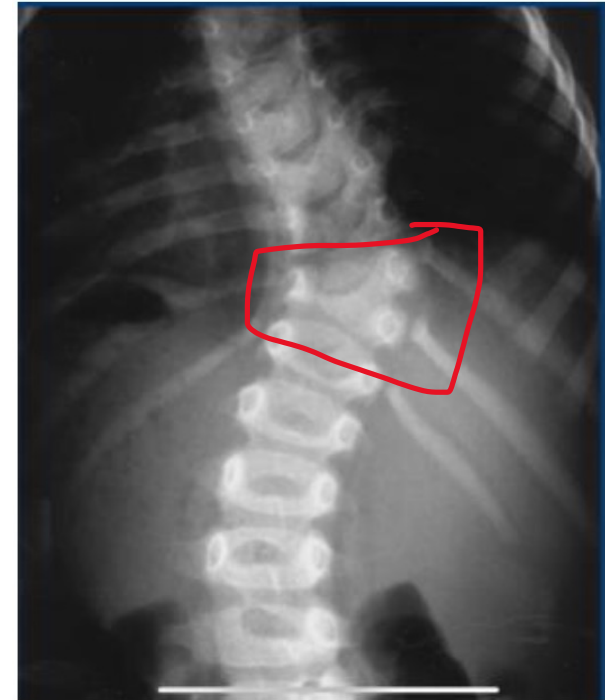
Q 24. A 4-year-old child with image for scoliosis:

- A. Infantile idiopathic scoliosis
- B. Congenital scoliosis
- C. Treatment is always surgical
- D. Always resolves spontaneously

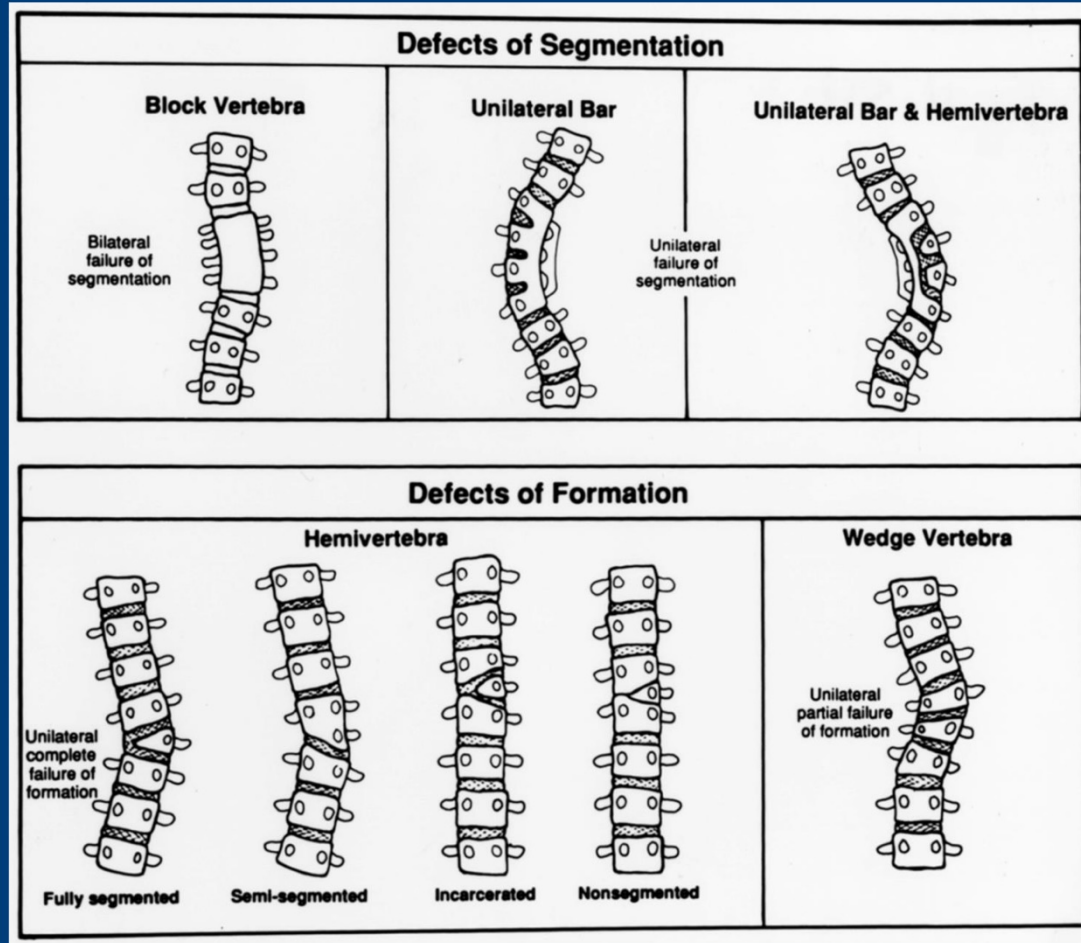


Answer : b

- **Congenital scoliosis**
  1. Failure of formation (wedge shaped /hemi vertebrae)
  2. **Failure of segmentation** (congenital bar/block vertebrae)
  3. Mixed
    - Progression depends on the type of the deformity affecting the vertebrae.
    - Defect is present at birth
    - Treatment is surgical.



# Congenital Scoliosis



Q 25- The worst remodeling in 3-year-old child:

- A. Distal humerus
- B. Distal metaphyseal femoral recurvatum
- C. Distal metaphyseal femoral procurvatum
- D. Proximal humerus in varus
- E. Distal tibia procurvatum

Answer: a

- In the **upper limb**, the higher growth potential is away from the elbow (proximal humerus/ distal radial & ulna)
- In the **lower limb**, the higher growth potential is around the knee ( distal femur & proximal tibia).

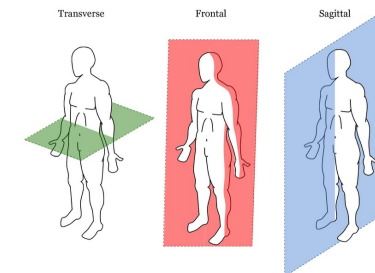
# Fractures in Pediatric skeleton

## The power of remodeling

Factors affecting remodeling potential of ALL Pediatric #

- **Years of remaining growth** – **most important factor**
- **Position in the bone** – the nearer to physis the better the remodelling
- **Plane of motion** – greatest in sagittal, the frontal, and least for transverse plane
- **Physeal status** – if damaged, less potential for correction
- **Growth potential of adjacent physis**  
UL e.g. proximal humerus better than distal humerus  
& distal radius better than proximal radius

❖ **Recurvatum/ Procurvatum** are directional terms for sagittal plane angulation



Q 26- A 3-month-old girl has been treated for DDH ever since she was 2 months old. She returned to the clinic after 4 weeks of Pavlik harness with reduced hip but acetabular dysplasia persists, which of the following is the next step:

- A. Continue using Pavlik harness
- B. Use of triple diapers
- C. Internal fixation with sth
- D. Surgical/ open fracture

Answer : a

- Duration of the Pavlik Harness: **8-12 weeks**, until the AIA  $<30^\circ$ .

In infants  $< 6$  months, the Pavlik harness is the first-line treatment for DDH.

- No role for double napkins in the treatment of DDH. ( Answer B)
- No role for internal fixation in DDH (Answer C)
- Surgical open reduction is reserved for failed closed treatment or older infants (typically  $>6$  months). (Answer D)

Q27- A 75-year-old woman came to the clinic because of sudden **interscapular pain** that happened when she works in her house and lasted for 12 days, and it didn't limit her daily activities and there were no red flags, she reported pain during flexion and extension, what is the next step:

- A. Dorsal spinal MRI
- B. Analgesia, limited bed rest, and return to work
- C. Dorsolumbar X ray

Answer: c

Most cases acute onset of back pain without red flags (Signs or symptoms of cauda equina syndrome) are treated conservatively. However, in such elderly patient, there is high suspicion of compression fracture therefore, dorsolumbar Xray is the best next step.

We have to rule out compression fracture ( wedge fracture) first.

Notes:

- Interscapular pain  $\Rightarrow$  related to thoracic spine
- Dorsolumbar Xray  $\Rightarrow$  visualize the vertebrae in the transition zone where the mid-back (thoracic or dorsal spine) meets the lower back (lumbar spine).

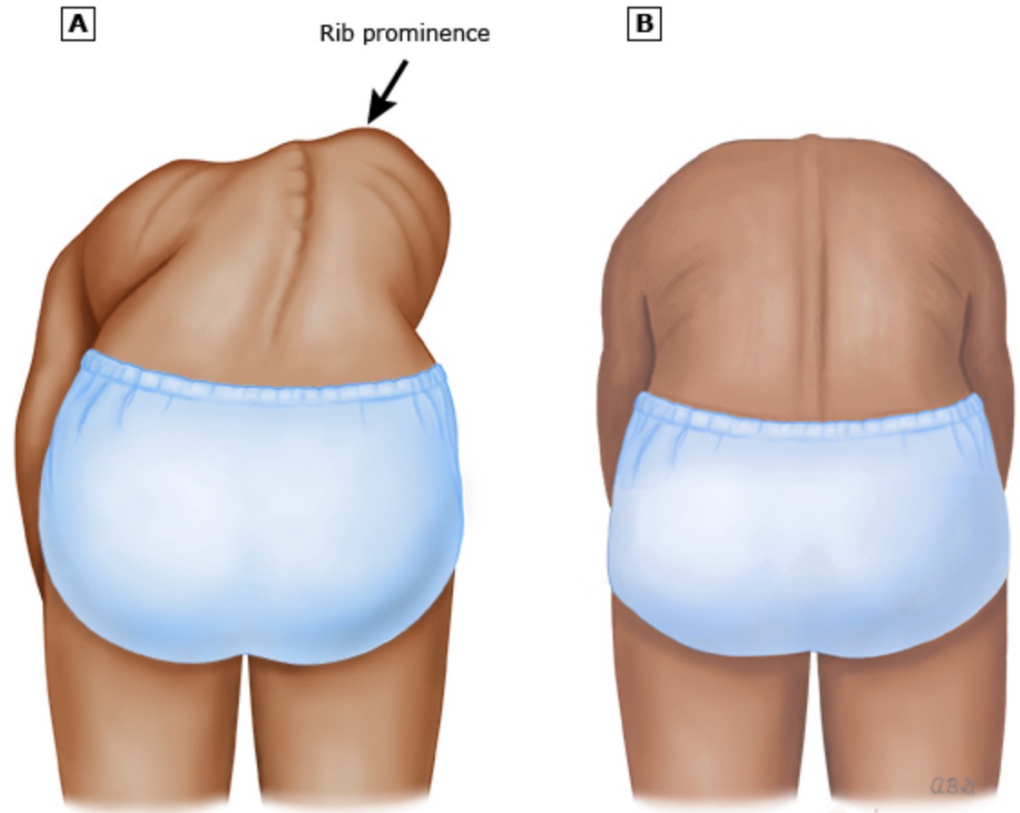
Q28- **True** about Idiopathic adolescent scoliosis:

- A. Always there is no pain
- B. Uneven shoulder is always present
- C. Rotational deformity is present on Adam forward bending test

Answer: c

The **Adams forward bend test** demonstrates the rotational component of scoliosis.

- AIS is usually painless, may or may not have shoulder asymmetry but it's not a role!



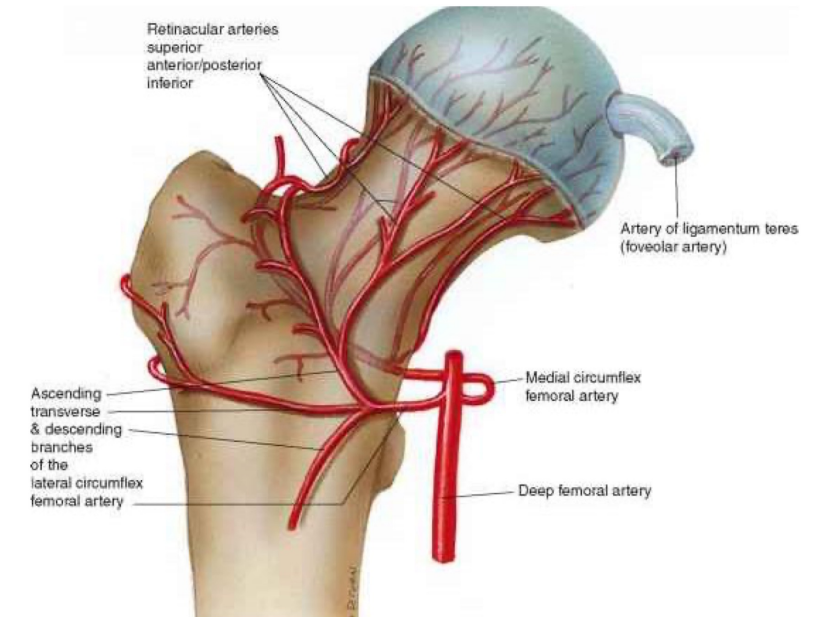
The Adams forward bend test

Q29- Intertrochanteric area to femur neck which of the following is true:

- A. Has high risk of avascular necrosis
- B. Has poor blood supply
- C. Has low bone osteogenic activity
- D. Has higher rate of malunion

Answer: d

- AVN is mainly a concern with femoral neck fractures ([Answer A](#))
- IT area is well-vascularized by perforating branches from the femoral circumflex arteries ([Answer B](#))
- the intertrochanteric region composed of cancellous bone, high osteogenic potential → faster healing ([Answer C](#))
- Although low risk of malunion when compared to femur neck fracture, there is still a risk of malunion and shortening.



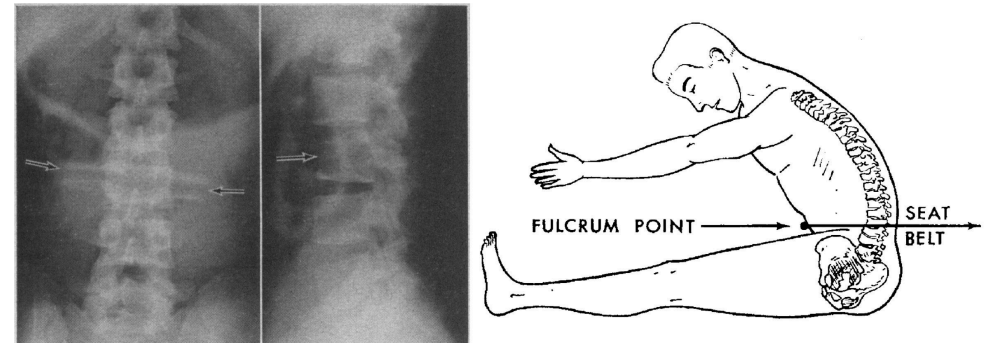
Feature	Intertrochanteric region	Femoral neck
Blood supply	Metaphyseal branches from medial & lateral femoral circumflex arteries (not end arteries)	Retinacular branches of medial femoral circumflex artery (functional end arteries)
AVN risk	Low	High
Osteogenic activity	High (abundant cancellous bone)	Lower
Synovium / hematoma	Outside capsule → hematoma preserved	Intracapsular synovium disperses hematoma
Union problem	Malunion (varus collapse, shortening)	Nonunion ± AVN
Fixation principle	Relative fixation — DHS	Anatomical fixation (young) / hip replacement (elderly)

Q 30- True about **flexion distraction** injury:

- A. Injury to base of skull
- B. Injury to C7
- C. Injury to calcaneus bone
- D. Small intestine injury

Answer: d

Flexion–distraction fractures (seatbelt injuries), also called **Chance fractures**, are associated with small bowel injuries; especially the 2<sup>nd</sup> part of the duodenum & ligamentum teres. Therefore, you should rule out **concomitant intra-abdominal injuries** in patients with these fractures.



Q31- Which of the following is false about pediatric skeleton:

- A. Soft tissue stronger than bone
- B. Cancellous : cortical ratio is high
- C. Thin periostium
- D. Incomplete fractures can occur

Answer: C

Children have **thick, active periosteum.**

Ligaments and tendons are relatively stronger than bone, so forces often cause fractures instead of ligament tears  
(Answer A)

Pediatric bones have more cancellous (spongy) bone relative to cortical bone, making them more porous and flexible.(Answer B)

Classic pediatric feature: greenstick and torus (buckle) fractures, both are incomplete fractures. (Answer D)

Q32- pain in osteomyelitis:

increase periosteal pressure

Q33- flat feet:

no need for treatment if no pain

2024

Q1. which of these tests will be positive with a Segond's fracture:

- a. Anterior drawer test
- b. Positive McMurray's test with leg internally rotated
- c. Positive McMurray's test with leg externally rotated
- d. Positive external rotation dial test with knee flexed at 30 degrees
- e. Positive posterior drawer test

Answer: A

**Segond's fracture** : avulsion fracture of the lateral tibial plateau, [next slide](#), if present, 95% there is ACL injury.

Special tests for ACL injury: anterior drawer test, **lachman's test** (most sensitive) & pivot test.

**McMurray's tests** (internal or external rotation) are about **meniscal** tears. ([Answer B/C](#)).

The external rotation dial test checks the posterolateral corner ([Answer D/E](#)).

# Second fracture



Q2. A lady fell on the ground and broke her T12, which of these fractures is consistent with these types of fractures:

- a. Lateral femoral epicondyle
- b. Tibial shaft
- c. Ankle joint
- d. Intertrochanteric

Answer: a

The concept of the **gravity line** can be applied to all the listed options except for the **lateral femoral condyle**.

It is not essential that only these specific bones fracture during an axial load; however, the closer a bone is to the center (**line of gravity**), the more likely it is to be injured by the vertical transmission of force.

While the ankle, tibia, hip, and T12 vertebra all sit along this primary weight-bearing axis, the lateral femoral condyle is positioned away from this central path. **To fracture the lateral condyle, you typically need a valgus force** or a direct lateral impact, rather than the vertical compression associated with a fall.

## Line of Gravity

- From base of skull
- C7
- T 12
- Sacroiliac joint ( bilateral)
- Femur head
- Medial condyle of femur and tibia
- Calcaneus



Q3. Extreme flexion of hip and knee during swing phase occurs in which of these types of gait:

- a. high steppage gait
- b. circumduction gait
- c. hiking
- d. Trendelenburg Gait

Answer: a

## Foot drop or slapping gait

- This is due to dorsiflexor weakness caused by paralysis of common peroneal nerve.
- There won't be normal heel strike, instead the foot comes in contact with ground as a whole with a slapping sound.
- So it is also known as "Slapping gait".

22-Mar-20

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- Due to plantarflexion of the ankle, there will be relatively lengthening at the leading extremity.
- **So to clear the ground the patient lift the limb too high.** Extreme flexion of hip and knee during swing phase
- Hence the gait gets its another name i.e. "High Stepping Gait"

22-Mar-20

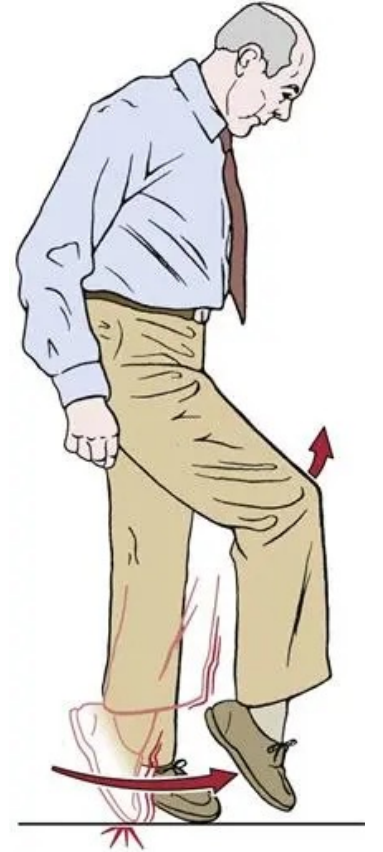
**High steppage** → excessive hip + knee flexion (deep peroneal nerve injury) [as seen in the picture](#)

**Circumduction** → leg swings out in a semicircle, not lifted high

**Hip hiking** → pelvis lifts, not the knee

**Trendelenburg** → pelvis drops on the opposite side due to weak abductors

ChatGPT ^^



Q 4. A 6-months girl presented to the clinic with 24 angles on acetabular index of her right leg, 29 angles on the left, what would you tell her parents:

- a. No need for treatment
- b. Pavlik harness
- c. Spica

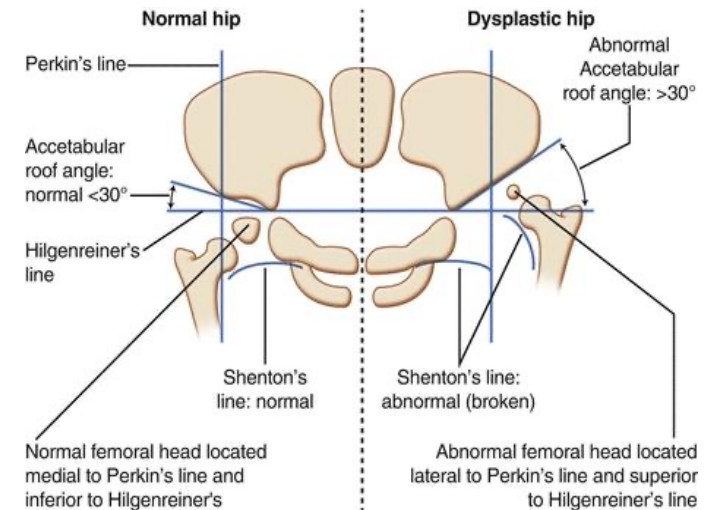
Answer: b

Lt is abnormal

Acetabular index angle (AIA) (Mirror of DDH)

The angle formed by an oblique line (through the outer edge of the acetabulum and triradiate cartilage) and the Hilgenreiner line.

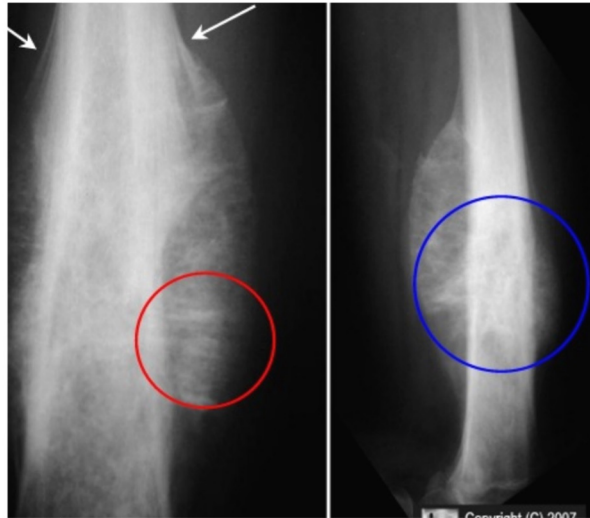
- In the infant <3months, a normal value < 30°.
- By the age of 6 months, the acetabular index decreases to 25°.



Q5. A young boy presented with pain in his knee for the past 6 months, imaging revealed a metaphyseal mass, with codmans triangle. What is you diagnosis.

- a. Osteosarcoma
- b. Osteochondroma
- c. Chondrosarcoma

Answer: a



## Osteosarcoma

- Typically occurs in the metaphysis around the knee adolescents.
- Classically high grade lesions.
- Note the sunray appearance (red and green circles).
- Note also Codman's triangle (arrows).

## General Features Of malignant tumors

- Rapid growth, warmth, and tenderness.
- Have periosteal reaction on x-rays:
  - Codman's triangle (periosteal elevation).
  - Sunburst pattern/Sunrays appearance.
  - Onion skin appearance (Ewing's sarcoma).



Q6. One of these statements regarding lateral patellar dislocation is incorrect :

- a. Internal tibial rotation
- b. Anterversion of the femur
- c. Increased Q angle
- d. vastus medialis dysplasia

Answer: a

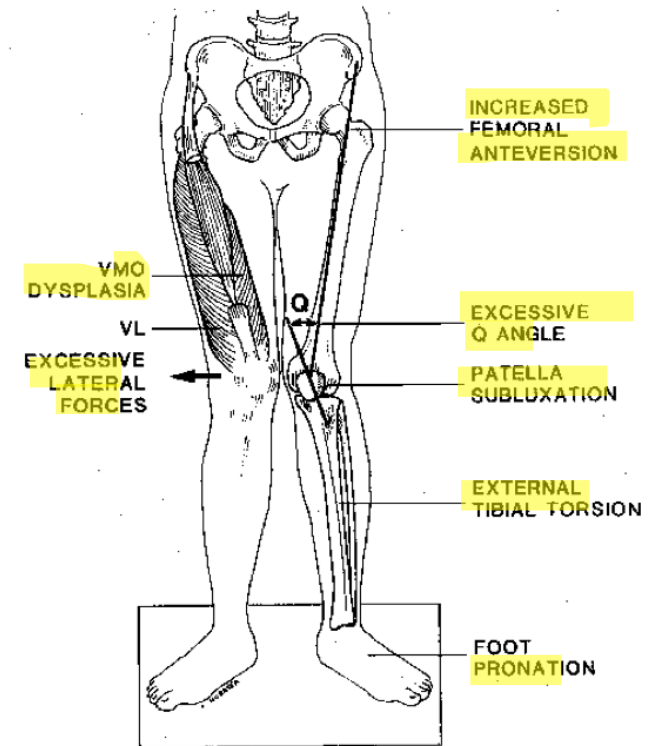
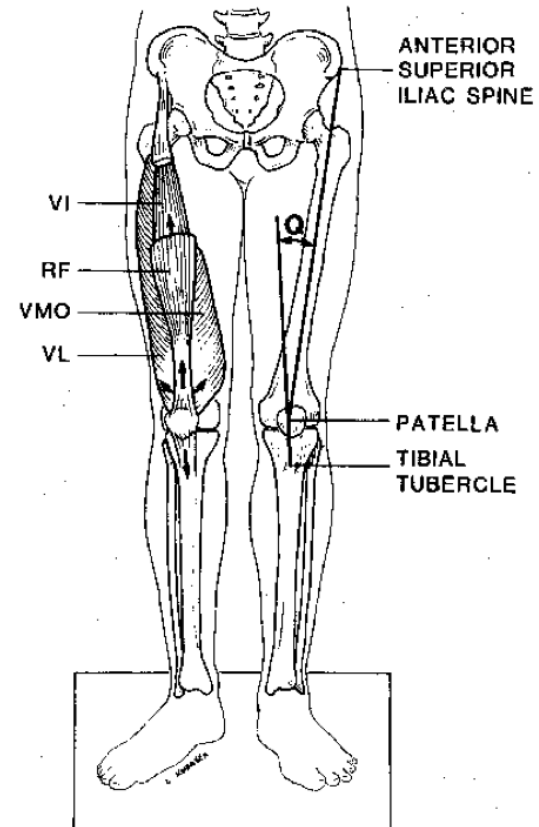
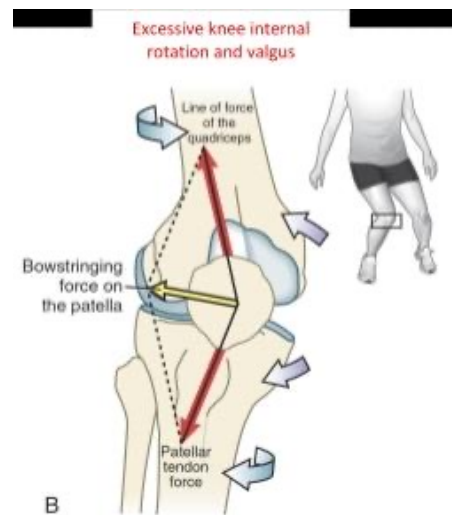
Lateral patellar dislocation is associated with patellar subluxation & ↑ **Q angle**,

Situations associated with ↑ Q angle :

1. Femoral anteversion ( 15°-20°)
2. Valgus leg deformity ( excessive lateral force)
3. External tibial rotation.
4. Vastus medialis dysplasia.

Dr. hamdan mentioned the **misarable triad**;

1.  $\uparrow$  femoral anteversion  $\Rightarrow$  thigh internally rotated
2. External tibial torsion
3.  $\uparrow$  Q angle  $\Rightarrow$  valgus + foot pronation



Q 7. An old lady fell and broke her hip, she presented with inability to bear weight and severe pain, her X-ray showed nothing, but you had suspicions for a fracture clinically, what is your next step.

a. CT

b. MRI

c. Discharge on painkillers.

Answer: b

A postmenopausal elderly woman is highly susceptible to **insufficiency (stress) fractures** due to osteoporosis. These fractures are often not detected on plain X-ray early. In this situation, **MRI is preferred because of its high sensitivity** for stress fractures and bone marrow edema.

**Stress fractures** are divided into two types;

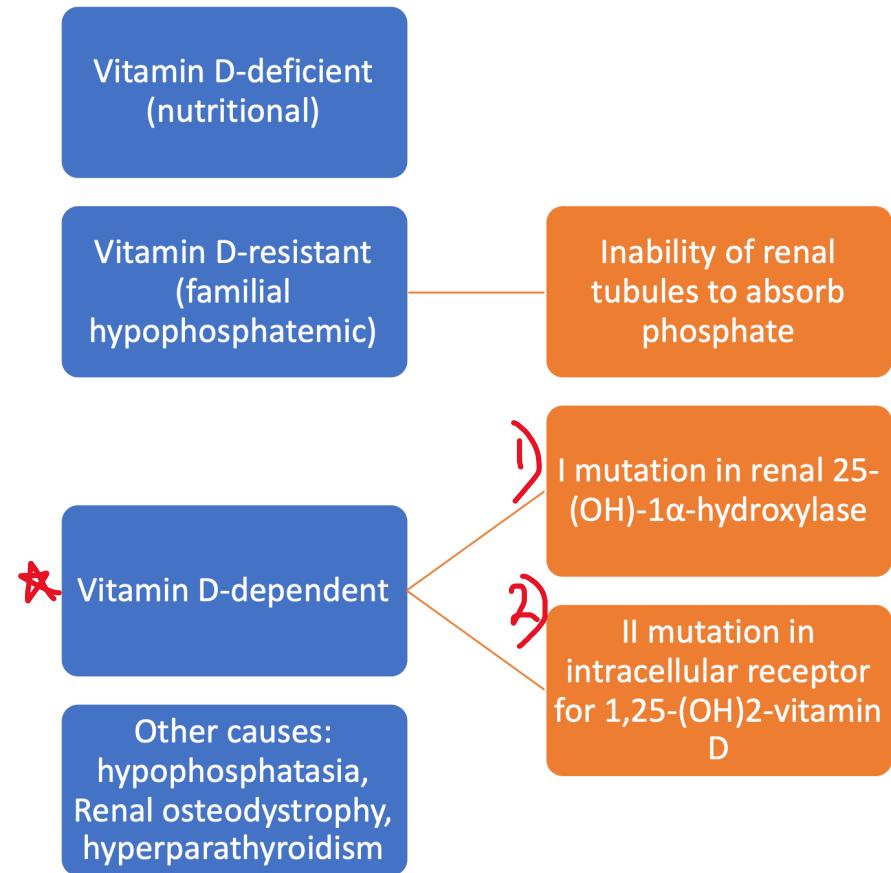
1. Fatigue fractures  $\Rightarrow$  abnormal (excessive) stress on normal bone.
2. Insufficiency fracture  $\Rightarrow$  normal stress on abnormal bone. **Dr. mar's notes**

Q8. 25 (OH) vitamin D alpha hydroxylase gene defect occurs in which of the following

- a. Vitamin D resistant Rickets
- b. Vitamin D dependent Rickets type 1
- c. Vitamin D dependent Rickets type 2

Answer : b

# Classification



Q9. an image for rocker bottom feet (bilateral), which of these statements is correct:

- a. Always treated surgically
- b. Associated with a talonavicular dislocation
- c. It carries a better prognosis when compared to a clubfoot

Answer: b

## **Congenital vertical talus (Rocker-bottom foot):**

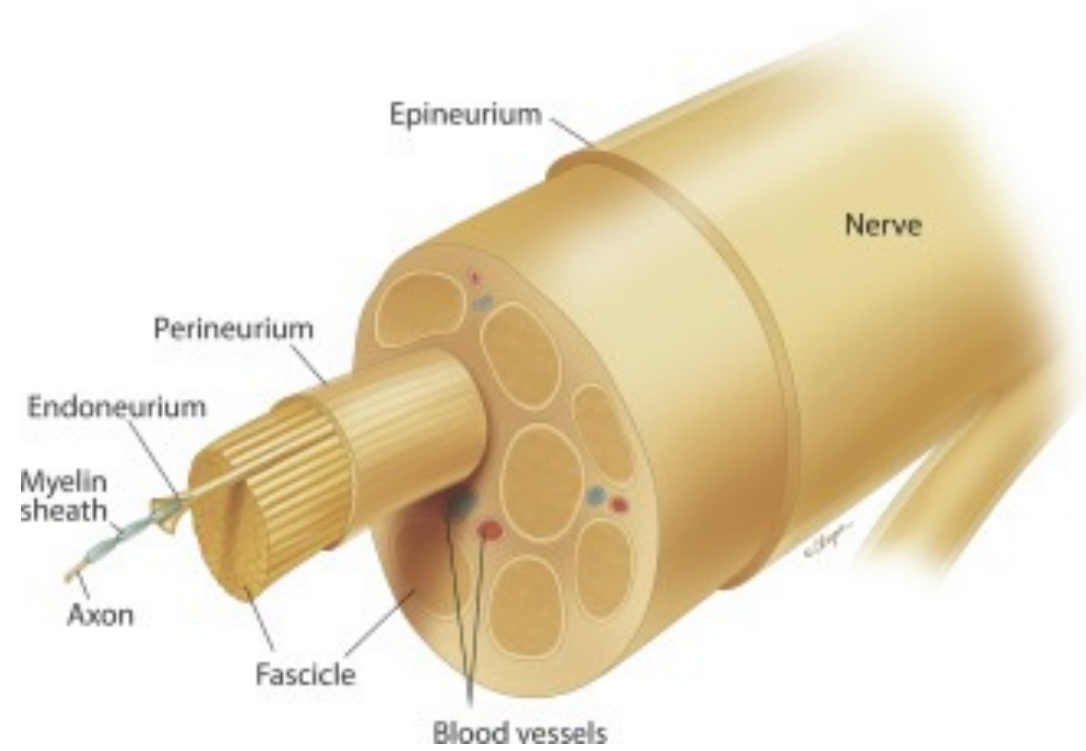
- Irreducible dorsal dislocation of the **navicular on the talus producing** a rigid flatfoot deformity:
  - Irreducible dorsolateral navicular dislocation
  - Vertically oriented talus
  - Calcaneal eversion with attenuated spring ligament
- Soft tissue contractures:
  - Displacement of peroneal longus and posterior tibialis tendon so they function as dorsiflexors rather than plantar flexors
  - contracture of the Achilles tendon
- **Worse prognosis than club foot.**
- Treatment by **serial casting** (reverse ponseti) and a small surgical procedure is needed before applying the last cast



Q10. Which of the following peripheral nerve structures functions to cushion the nerve against external pressure:

- a. Endoneurium
- b. Fibronectin
- c. N-cadherin
- d. Epineurium
- e. Perineurium

Answer: d



Q11. Which of these combinations is correct:

- a. Ulnar - hypothenar atrophy
- b. Medial – wrist drop
- c. Radial – Froment's sign
- d. Femoral – foot drop

Answer: a

The correct match :

1. Ulnar nerve  $\Rightarrow$  Froment's sign / hypothenar atrophy
2. Radial nerve  $\Rightarrow$  Wrist drop
3. Median nerve  $\Rightarrow$  "OK sign" weakness (anterior interosseous nerve)
4. Common peroneal nerve  $\Rightarrow$  Foot drop
5. Femoral nerve  $\Rightarrow$  Weak knee extension (quadriceps),  $\downarrow$  patellar reflex

Q12. Which of the following statement about flat foot is correct

No need for treatment if there's no pain

Q13. what is the first movement that is lost in a frozen shoulder:

- a. external rotation
- b. internal rotation
- c. abduction
- d. adduction

Answer: a

## Frozen shoulder

- It is a disorder in which the shoulder capsule **becomes inflamed, stiff and grows together with abnormal bands of tissue, called adhesions.**
- Frozen shoulder is characterized by pain and **loss of motion or stiffness in the shoulder.**
- Pain is usually constant, worse at night, when the weather is colder.
- It affects more women than men. The recovery is very slow.
- **First movement to be lost is external rotation**
- It is idiopathic pathology

Q14. Which of these statements about bone fractures in children is correct

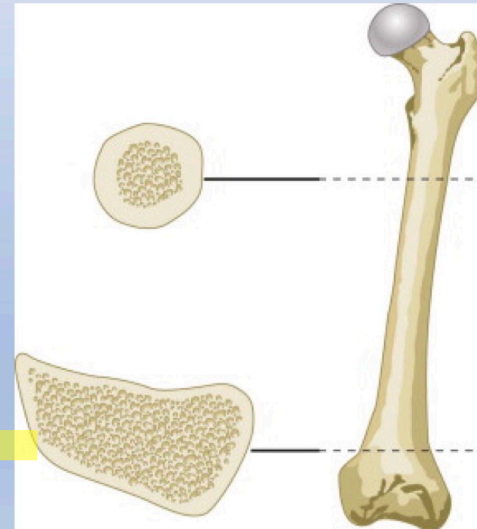
fractures in children tend to be less comminuted fractures.

# Fractures in Pediatric skeleton

## High porosity;

- Increased cancellous bone
  - ↳ reduces tensile strength
  - ↳ reduces tendency of fracture to propagate

Less comminuted fractures



Q15. The most common mechanism that will cause hand infection is:

- a. Lymphatic spread from the forearm and arm
- b. Hematogenous spread
- c. Direct spread
- d. Direct inoculation
- e. Infected thrombi

Answer :d

Hand infections occur usually due to trauma.

Q16. A 14 year old girl with Scoliosis, which of these statements will you tell her parents when it comes to the management:

- a. Most rotational deformities are apparent in the thoracic region
- b. Menarche isn't a prognostic factor for the progression of scoliosis
- c. It usually starts to progress around the age of 5 years.
- d. The main reason for surgery in her case is cosmetic

Answer: a

Right thoracic curve is the most common idiopathic curve.

- The risk of progression depends on the following parameters: (Answer B )
  1. Growth potential of the patient.
  2. Magnitude of curve
  3. Type of curve
  4. Sex of the patient
- In prepubertal children, rapid progression is labile to occur during the growth spurt (Answer C)
- The main goal of surgery is to prevent progression (Answer D)

Q17. A 50-year-old female patient presented with history of low back pain for 3 months. without radicular symptoms or red flags. on examination the pain becomes worse with flexion although the patient can do full range of motion. the best course of management:

- a. Oral steroids
- b. Lumbo-sacral spine x-ray
- c. Analgesia, limited bed rest, and return to work as pain allowed
- d. Intra-muscular steroid injection
- e. Lumber MRI

Answer: c

# Notes:

- Most patients deny previous attacks of low back pain.
- Pain after lifting a heavy object → disc prolapse or muscular pain.
- Buttocks pain is usually referred from the back.
- In sciatica pain is in a dermatomal distribution.
- Age of back pain is between 20 and 45, above or below this is usually abnormal.
- Most common type of back pain is non-specific back pain.
- Education is very important to prevent recurrence.
- Back pain → 60% resolve spontaneously within 6 weeks. 40% become chronic (> 3 months or Multi recurrent in 3 months )
- 85% of back pain is due Musculoskeletal causes
- History is the most important thing in Dx.
- In Disc prolapse the spine tilt away from the pathology when the nerve compressed from above , and tilt toward the pathology when compressed from below.
  - Sciatic scoliosis and lumbar disc herniation. They found that if the lesion is located laterally in the disc space, then the list occurs to the contralateral side.
  - If the protrusion is lateral to the nerve root, then the patient will lean away from the lesion, whereas if the protrusion is medial to the root the list will be towards the lesion
  - Patients with lumbar disc herniation and sciatica scoliosis tended to list to the side opposite to the sciatica, producing convexity towards the side of the sciatica
- Thrombosis is rare but can cause back pain , it come in ( severe pain , old age , history of vascular diseases and not affected by position as disc pain ).
- A pt with lower back pain , -ve red flags , -ve vascular , -ve neural signs :
  - Reassure the patient , give NSAIDs , give muscle relaxant , local NSAIDs if needed , must be used in high frequency , topical apply and for 2-3 min uncovered to be absorbed.
  - Rest is for 2 days only. after that you encourage the pt to return to his daily activity .
  - Physiotherapy : Cold for analgesia ( early ) , Hot for increase blood supply → increases the level of the drugs reaching the tissue
  - Pt education about the activity he can do and the best positions of sitting and lifting objects .. etc.
- The chronic back pain that come and go unnoticed , usually there is minor traumatic events that cause fissuring in the annulus fibrosus and when the major lifting happened it cause the herniation .
- 80 % there is a trauma ( Normal disc } that cause the disc to fissure, 20 % of cases the cause is degenerative ( black disc ) and usually pt's have sitting intolerance ( not able to sustain a specific sitting position for long time )
- Some disc prolapses are positional, you need dynamic MRI to detect.
- 93% of patient with disc prolapse only need conservative tx. and 7 % need surgery

Q18. a young boy presented to the clinic with pain in his knee for the past 6 months, and shortened leg (leg length discrepancy), which of these do you suspect:

- a. Perthe's
- b. Osteosarcoma
- c. Osteochondroma
- d. Ewing's sarcoma

Answer: a

In a patient with Knee pain always suspect a possible hip pathology!

**Perthes disease** usually occurs in **young boys** (< 9 years) in contrast to SCFE which typically occurs in **adolescents** (12-14 year). Patients commonly present with a **limp** and **pain** in the groin, hip, commonly thigh, or knee regions (referred pain).

### **Physical examination of perthes**

- a. Abnormal gait (antalgic).
- b. Decreased abduction and internal rotation.
- c. Late Limb-length inequality, is mild due to femoral head collapse.

Q 19. a man presented to the ER with a shoulder dislocation after a hypo-calcemic seizure, what type of shoulder dislocation is this (image showing light bulb sign)

- a. Posterior shoulder dislocation
- b. Anterior shoulder dislocation
- c. Inferior shoulder dislocation
- d. Greater tuberosity fracture
- e. Lesser tuberosity fracture

Answer: a

**Lightbulb** sign is a characteristic Xray finding of humeral head in *posterior shoulder dislocation*.

**Seizures/ electrocution victim**  $\Rightarrow$  violent contraction of internal rotators drives the humeral head posteriorly.



Q20. select the patient with the best remodeling potential:

- a. 4-year-old - proximal humerus fx
- b. 10-year-old – distal tibia fx
- c. 70-year-old with femur neck fx
- d. 20-year-old with proximal tibial fx

Answer: a

# Fractures in Pediatric skeleton

## The power of remodeling

Factors affecting remodeling potential of ALL Pediatric #

- **Years of remaining growth – most important factor**
- **Position in the bone** – the nearer to physis the better the remodelling
- **Plane of motion** –  
greatest in sagittal, the frontal, and least for transverse plane
- **Physeal status** – if damaged, less potential for correction
- **Growth potential of adjacent physis**  
e.g. proximal humerus better than distal humerus  
& distal radius better than proximal radius

Next slide ←

Notes from dr. Omar Samara's lecture :

**Plane of motion** refers to the relationship between the direction of fracture **angulation** and the **plane of movement** of the adjacent joint. If the direction of fracture angulation lies in **the same plane** as the joint's normal range of motion, remodeling potential is better, and vice versa.

Ex: In supracondylar fractures of the humerus, dorsal (posterior) angulation occurs in the sagittal plane. Because the elbow primarily moves in flexion and extension (which also occur in the sagittal plane), this deformity can remodel over time through normal joint motion.

On the other hand, if an elbow fracture is angulated in the coronal plane (varus or valgus deformity), remodeling is poor because elbow motion does not significantly occur in that plane. In such cases, spontaneous correction is unlikely, and surgical intervention is usually required.

Q21. In acute osteomyelitis, the pain is caused by

- a. Increased intraosseous pressure
- b. Abscess formation
- c. Periosteal reaction
- d. Avascular necrosis
- e. Fracture

Answer: a

Infection triggers inflammation inside the rigid medullary cavity. Pus and edema accumulate, but bone can't expand. The result is **rising intraosseous pressure**, which compresses venous outflow, irritates nociceptors, and produces deep, throbbing pain. **ChatGPT**

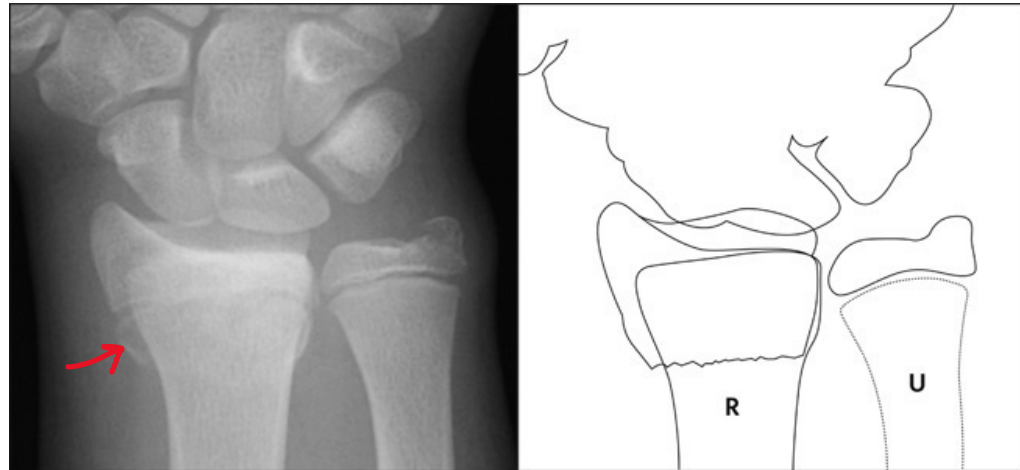
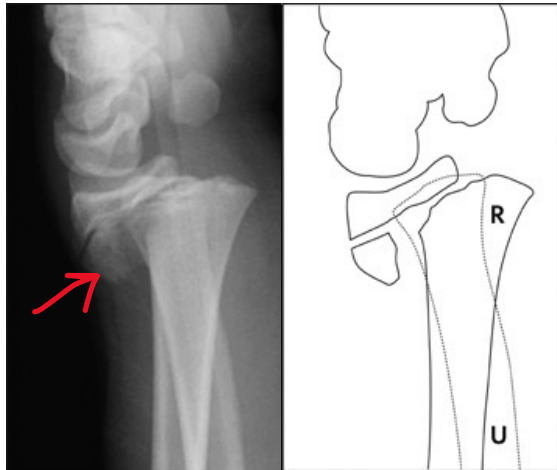
Q22. distal radius X-ray, what is the type of fracture (it appears this was copied from an Orthopedics website), this is the image:

- a. SH1
- b. SH2
- c. SH3
- d. SH4
- e. Wrist dislocation



**AP and lateral x-ray**

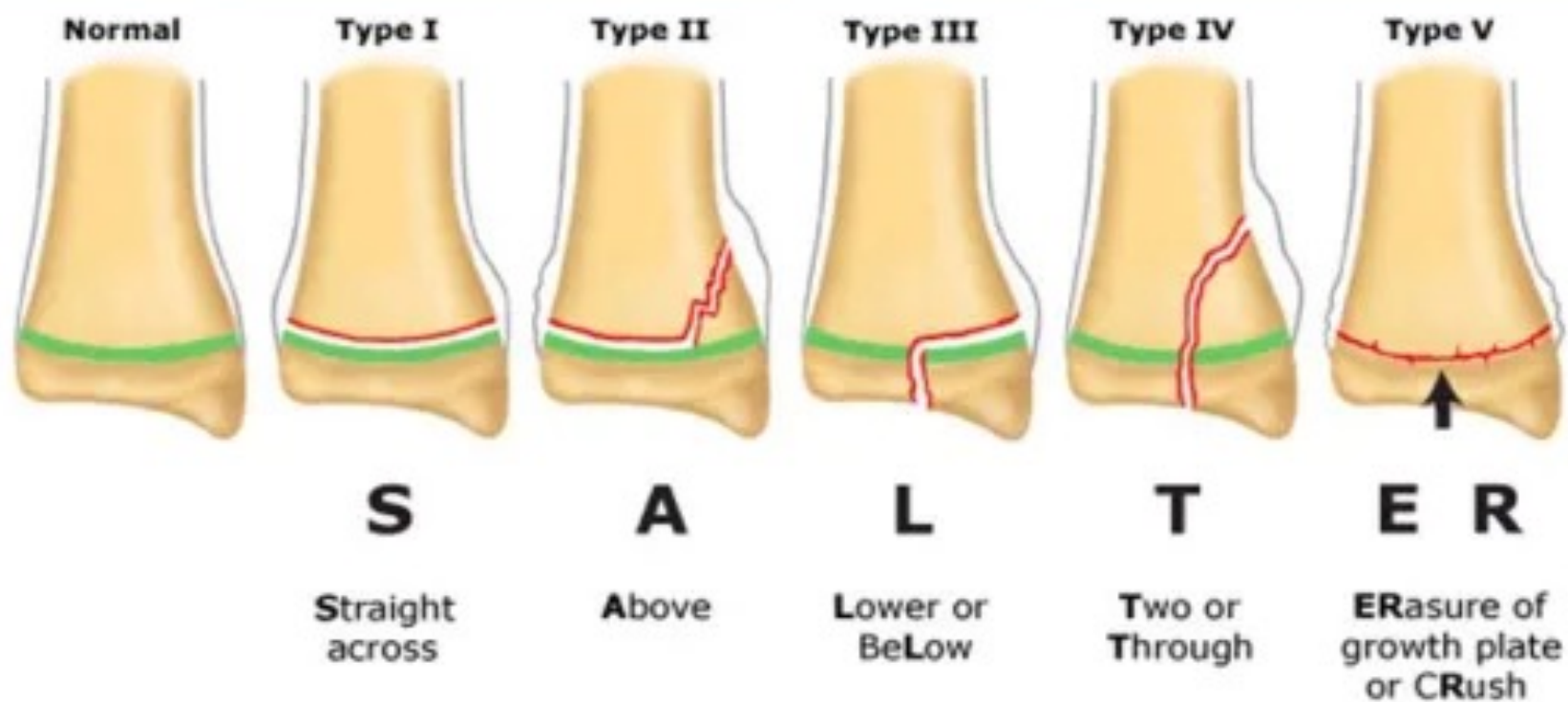
Answer: b



The fracture extends through the growth plate and then through the **metaphysis** (arrows)

## Salter-Harris classification of physeal fractures

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Q23. what is the most common organism in a human bite:

- a. Polymicrobial
- b. Eikenella corrodens
- c. staph.aureus
- d. Pasteurella

Answer: b

Although human bite infection is polymicrobial, the most common organism to cause human bite (clenched-fist injuries) is *Eikenella corrodens*.

Human bite → *Eikenella*

Animal bite → *Pasteurella*

Q24. a man had an lawnmower accident and lost his 2nd, 3rd and 4th toes, he somehow **got in the soil**. You give him Penicillin to cover for what organism:

- a. Clostridium
- b. Staph aureus
- c. Streptococcus

Answer: a

Anaerobes from the soil → clostridium

ChatGPT

Q25. an image showing hemivertebra, which of the statements is true

- a. Idiopathic infantile scoliosis
- b. Usually resolves on its own
- c. Congenital scoliosis
- d. Late-onset presentation usually has better prognosis than early-onset in this case

Answer: c

There are 3 types of structural scoliosis:

- **Congenital scoliosis**
  1. Failure of formation (wedge shaped /hemi vertebrae)
  2. Failure of segmentation (congenital bar/block vertebrae)
  3. Mixed
    - Progression depends on the type of the deformity affecting the vertebrae.
    - Defect is present at birth
    - Treatment is surgical.
  
- **Neuromuscular Scoliosis**
  - Also known as secondary scoliosis.
  - Occurs due to imbalance between sides of the spine as result of muscle spasticity.
  
  - Probably caused by Poliomyelitis, cerebral palsy, neurofibromatosis.
  - Treatment is surgical.
  
- **Idiopathic scoliosis**
  - According to age group
    - Infantile (0-3 years).
    - Juvenile (3-9 years).
    - Adolescent (10-18 years, most common type).

Q26. which of these options isn't a risk factor for OA?

- a. RA
- b. DM
- c. BMI of 31
- d. Female
- e. Osteoporosis

Answer: e

**Risk factors for OA**

1-Older age, Obese Female

2-Genetic inheritance

3-Race & ethnicity

4-Previous joint injury

5-Metabolic syndrome

6-Local mechanical factors

Q27. the image showing a fractured femur; which one is correct:

- a. Unstable intertrochanteric fracture
- b. Stable intertrochanteric fracture
- c. Subcapital femur neck fracture
- d. transcervical femur neck fracture
- e. basicervical femur neck fracture



Answer: a

Intertrochanteric fractures can be classified as **stable** or **unstable**.

**stable fractures** → lesser trochanter is not displaced, no comminution, and the medial cortices of the proximal and distal fragments are in alignment.

**unstable fractures** → displacement occurs, comminution is present, or multiple fracture lines exist.

## Intertrochanteric fracture classification

### Evans Classification



Stable



Stable



Unstable



Unstable



Unstable

Q28. a lady presented with back pain, straight leg rise  $<30$ , weakness in the extensor hallucis longus and 1st web space, what is the most probable diagnosis:

- a. L4/L5 prolapse
- b. L4/L5 spondylosis
- c. L4/L5 spondylolisthesis
- d. L3/L4 prolapse
- e. L3/L4 spondylolisthesis.

Answer: a

Straight leg rise + EHL+ web space = L5 root.

Prolapse ⇒ Disc herniation at L4/L5 → compresses **L5 root**.

Spondylosis ⇒ Degenerative, chronic, more back pain and stiffness than acute radicular signs.

Spondylolisthesis ⇒ Vertebral slippage, can cause back pain, sometimes radiculopathy.

Q29. a women injured her hand with a sharp object, and you suspected an injury to the nerve found inside the carpal tunnel, what would you find on the PE:

- a. Weakness and numbness in radial 3<sup>1/2</sup> fingers
- b. Weakness and numbness in ulnar 3<sup>1/2</sup> fingers
- c. Weakness and numbness in ulnar 1<sup>1/2</sup> fingers

Answer: a

What the **median** nerve supplies in the hand:

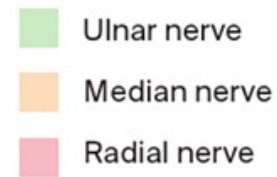
•**Sensation:**

Palmar surface of the radial 3½ fingers

(thumb, index, middle, and radial half of the ring finger)

•**Motor:**

Thenar muscles → thumb opposition, abduction, flexion



AO

Q30. you won't see a callus formation in this fracture when this instrument is used:

- a. Compression plates
- b. K wire
- c. IM nail
- d. external fixator

Answer: a

Absolute stability → Primary bone healing → NO callus

Relative stability → Secondary healing → Callus forms

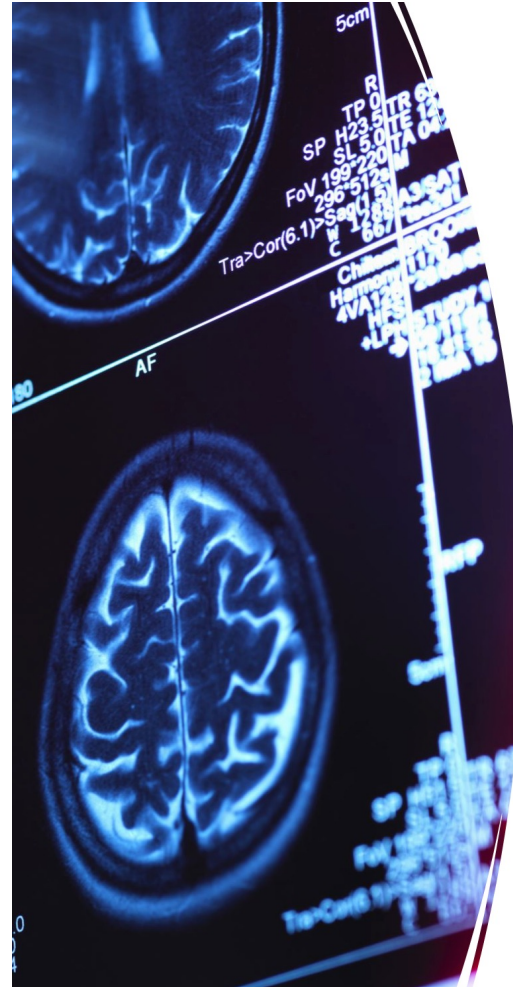
Absolutely stable fractures:

1. lag screws
2. compression plates
3. tension band wiring

Q31. a patient presented to your clinic with a knee pain, upon investigation and bone scintigraphy, you found multiple lytic lesions, what is the most probable locations of the primary tumor that caused these mets:

- a. Prostate
- b. Thyroid
- c. Lung
- d. Kidney

Answer: c



## Secondary Tumors (Metastases)

---

- More common than primary lesions.
- Occur mainly after the fifth decade.
- Usually in the axial skeleton.
- Most commonly from:
  - Lung: lytic lesions, can occur distal to the knee or elbow, poor prognosis.
  - Breast: mixed lesions, relatively good prognosis.
  - Prostate: sclerotic lesions, good prognosis.
  - Kidney: lytic hypervascular lesions.
  - Thyroid: poor prognosis.

Q32. Which of these conditions is **least likely** associated with heterotopic ossification in an immobilized patient?

- a. Traumatic brain injury
- b. Ankylosing spondylitis
- c. Spinal cord injury
- d. Severe burns
- e. THR

Answer : b

Bone healing can be complicated by the formation of ectopic bone within skeletal soft tissues (heterotopic ossification [HO])

Most common presentation is pain around the site of HO associated with decreased range of motion.

Risk factors :

1. After trauma or fractures
2. Orthopedic surgery (hip arthroplasty is classic)
3. Spinal cord injury
4. Head injury (neurogenic HO)
5. Burns

Q33. in the triad of reduction, immobilization, and rehabilitation, which of these statements is true:

- a. Callus formation is a feature of primary bone healing under absolute stability.
- b. Intraarticular fractures require anatomical reduction
- c. Early rehabilitation should be delayed until radiographic union is complete in all fractures.
- d. long bone fracture are always treated with internal fixation
- e. Closed reduction is contraindicated in all displaced fractures.

Answer: b

Callus = secondary healing (Answer a).

Early, guided rehab is encouraged (Answer c) .

Long bones can be managed conservatively or with external fixation depending on fracture type and patient condition. (Answer d) .

Many displaced fractures can be closed-reduced (Answer e).

2023

Q1. A 30-year female patient presented with 1 week history of mechanical low back pain, without radicular symptoms or red flags. On examination the pain becomes worse with flexion and extension although the patient can do full range of motion. The best course of management is :

- a. Oral steroids
- b. Analgesia, and bed rest
- c. Lumbar spine MRI
- d. Facet joint injection
- e. Lumbosacral spine X-ray

Answer: b

مرررة مكررة

Q2. Conditioning exercises aim to :

- A. Lower the resting blood pressure
- B. Increase the submaximal heart rate
- C. Increase the resting heart rate
- D. Decrease cardiac output during exercise
- E. Decrease the stroke volume

Answer: a

**Deconditioning** : functional impairment or loss due to long period of immobility

1. muscle loss and weakness, including heart muscles. → Deconditioning due to decreased physical effort
  - a. 1% every day after decreased physical effort
  - b. 5-10% after 1 week
  - c. 50 % after 1 month
2. abnormal distribution of body fluids → Deconditioning due to lack of gravity or non-standard gravity action (e.g., during bed rest)
3. Bone weakness
  - a. For bones to maintain strength it has to be mechanically strained
4. Immobilization hypercalcemia
  - a. Due to increased bone remodeling
5. Heterotopic ossification "HO"
  - a. Bone tissue forms outside of the skeleton.
  - b. Most frequently is seen with either musculoskeletal trauma, spinal cord injury, burns or traumatic brain injury injury.
  - c. most common presentation with pain around the site of HO
6. Contracture
  - a. Loss of passive range of movement
  - b. Caused by intrinsic or extrinsic factors
  - c. A muscle contracture is a permanent shortening of a muscle or joint. Caused by prolonged hypertonic spasticity in a concentrated muscle area, like in spastic cerebral palsy.
7. Joint stiffness
  - a. Lack of movement → lack of blood supply from synovial to cartilage → ischemic changes
8. Respiratory System → atelectasis and PE
9. CVS
  - a. DVT
  - b. Orthostatic hypotension
  - c. Cardiac muscle atrophy → increased baseline HR, increased submaximal HR, constant maximal HR (as it depends on age), decreased CO

Q3. Iliopsoas undergoes concentric contraction during :

- a. Mid stance
- b. Pre-swing
- c. Mid-swing
- d. Terminal stance
- e. Terminal swing

Answer: b

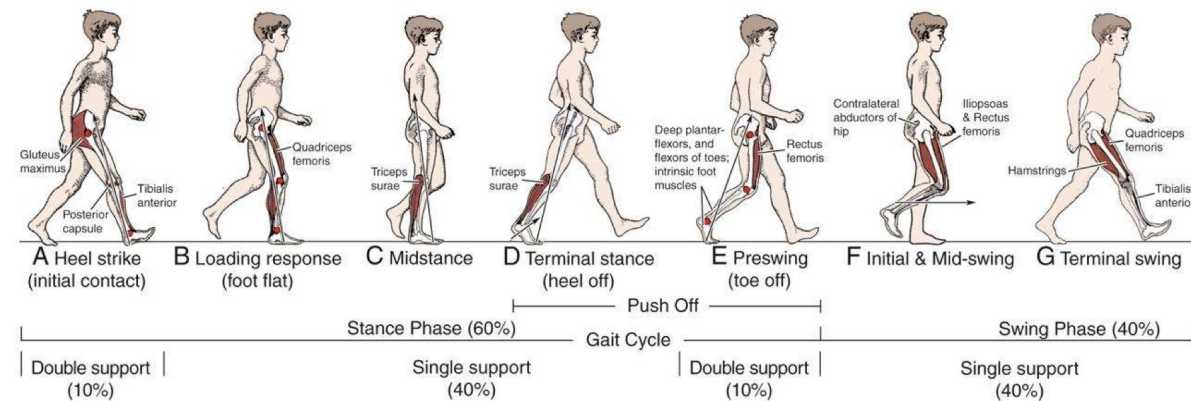
Mid-stance → hip extending (iliopsoas lengthening) (Answer A)

Terminal stance → maximal hip extension (Answer D)

**Pre-swing → iliopsoas concentric contraction begins**

Mid-swing → hip flexion continues mostly from momentum + other flexors (Answer C)

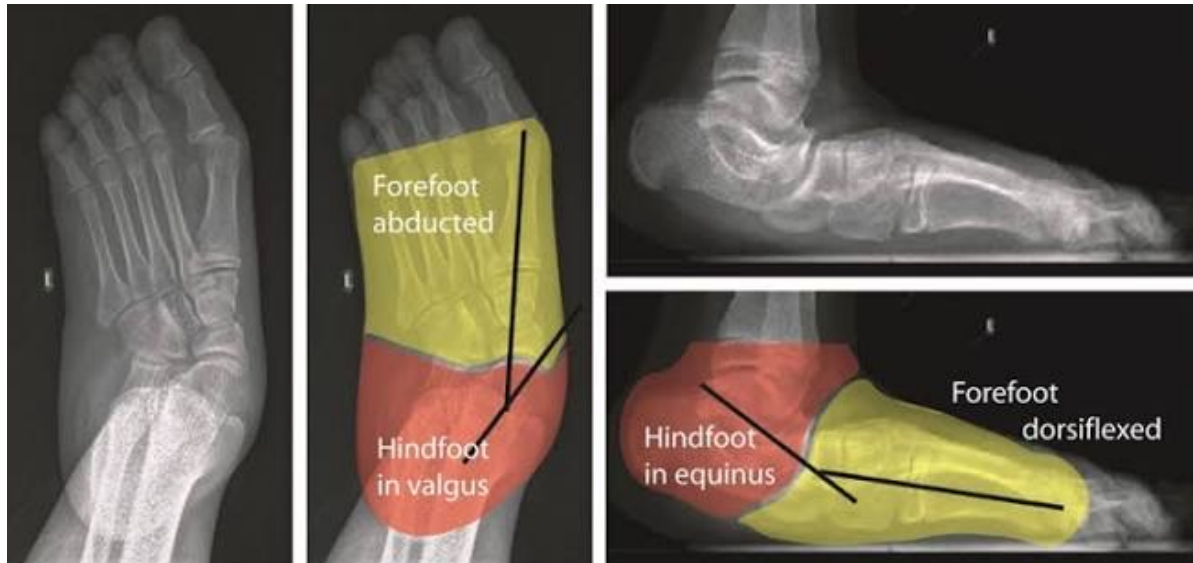
Terminal swing → hamstrings eccentrically slow the limb (Answer E)



Q4. A child is brought to the pediatrician due to abnormal foot shape and discomfort when bearing weight. Physical examination reveals **midfoot** dorsiflexion, abduction and dorsiflexion of the **forefoot**, and valgus heel, what is the most likely diagnosis?

- A. Clubfoot
- B. Congenital talipes equinovarus
- C. Congenital vertical talus
- D. Metatarsus adductus
- E. Tarsal coalition

Answer: c



### Congenital vertical talus (Rocker-bottom foot):

- Irreducible dorsal dislocation of the navicular on the talus producing a rigid flatfoot deformity:
  - Irreducible dorsolateral navicular dislocation
  - Vertically oriented talus
  - Calcaneal eversion with attenuated spring ligament
- Soft tissue contractures:
  - Displacement of peroneal longus and posterior tibialis tendon so they function as dorsiflexors rather than plantar flexors
  - contracture of the Achilles tendon
- Worse prognosis than club foot.
- High incidence with various congenital anomalies and neuromuscular diseases; such as:
  - ✓ Myelomeningocele
  - ✓ DDH
  - ✓ Arthrogyriposis
  - ✓ Trisomy 13
  - ✓ Marfan syndrome
- **Presentation: (Rigid rocker-bottom deformity)**
  - Fixed hindfoot equinovalgus: due to contracture of the Achilles and peroneal tendons
  - Rigid midfoot dorsiflexion: secondary to the dislocated navicular
  - Forefoot abducted and dorsiflexed: due to contractures of the EDL, EHL and tibialis anterior tendons
- Treatment by serial casting (reverse ponseti) and a small surgical procedure is needed before applying the last cast



Q5. Which of the following is abnormal ?

- A. Heart rate 80 in athletes
- B. Respiratory rate of 16 breaths per minute in a 50-year-old male recovering from knee replacement surgery
- C. Blood pressure 140/90 in a 60-year-old female undergoing shoulder rotator cuff repair surgery

Answer: c

Not sure ^^

Q6-Which of the following is used in primary bone healing ?

- a. Intramedullary Nailing with Elastic Nails
- b. Lag screws
- c. Functional bracing
- d. External fixation
- e. Casting

Answer: b

**Absolute stability**  $\Rightarrow$  primary bone healing  $\Rightarrow$  no calus formation

Absolute stability achieved by :

1. Lag screws
2. Compression plates
3. Tension band wiring

Q7-Pes planus, how to differentiate between flexible and rigid types ?

- a. MRI
- b. CT scan of the foot
- c. Xray of the foot
- d. Simple bedside physical exam
- e. Ultrasound of the foot

Answer: d

## **Pes planus (Flat foot):**

- Clinical assessment:
  - In the common flexible flat feet, there are usually no symptoms, but the parents notice that the feet are flat or that the shoes wear badly.
  - The deformity becomes noticeable when the youngster stands. The first test is to ask him or her to go up on their toes: if the heels invert and the medial arches forms up, it is a flexible (or mobile) deformity. This can also be checked by performing the jack test (also called the great toe extension test (toe raise)): with the child seated, feet planted firmly on the floor, the examiner firmly dorsiflexes the great toe; the medial arch should re-appear while the heel adopts a more neutral position and the tibia rotates externally.
  - A tight Achilles tendon may induce a compensatory flat-foot deformity.
- X-rays are unnecessary for asymptomatic, flexible flat feet.
  - If painful or stiff flat feet → use x-ray
  - If tarsal coalitions → CT

Q 8. Which of the following is true about flat foot?

- A. No need for treatment if there's no pain
- B. Medial arch support will help get rid of the deformity if used continuously
- C. The heel becomes varus and the foot pronates at the midfoot .
- D. Rigid form is the most common
- E. Most noticeable when the patient is sitting with feet elevated off the ground

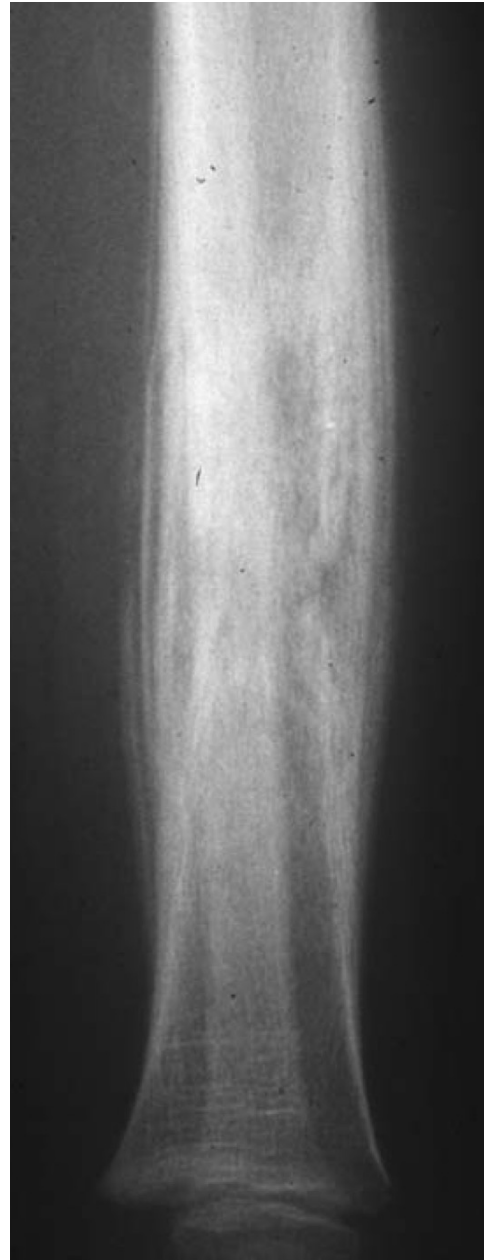
Answer: a

**Pes planus (Flat foot):**

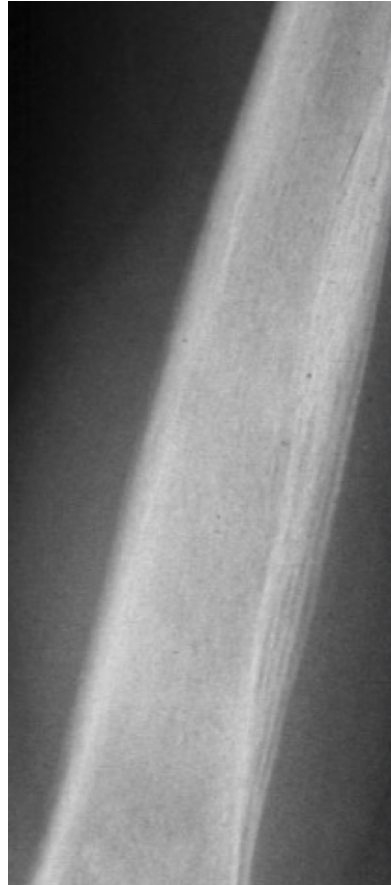
- Treatment:
  - Physiologic “flexible” flat foot: reassurance “deformity” will probably correct itself out if young enough“. (Medial arch support only if there was genuine medial foot pain, but this doesn’t get rid of the flat foot deformity.) remember 15-25% of adults have flexible flat feet.
  - Rigid type might need surgery if symptomatic enough however we always start conservatively

Q9-What is the diagnosis?

- a. Chondrosarcoma
- b. Giant cell tumour
- c. Osteoid osteoma
- d. Enchondroma
- e. Ewing sarcoma



Answer: e



## Ewing's sarcoma

- Typically occurs in the shaft of very young patients (1<sup>st</sup> and 2<sup>nd</sup> decades).
- May have constitutional symptoms.
- Radio- and chemo-sensitive.
  - Notice the onion skin periosteal reaction.



Q10. A 25-year-old male presents to the emergency department after sustaining a traumatic injury to his right knee during a sports activity. He describes a sudden twisting motion of the knee followed by severe pain and inability to bear weight. On examination, there is obvious swelling and deformity of the knee joint. The patella is laterally displaced, and there is tenderness and palpable crepitus over the lateral aspect of the knee. X-rays of the knee reveal joint effusion and multiple loose bodies within the joint space. What is the most likely cause of his findings?

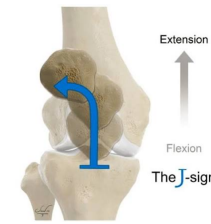
- a. ACL injury
- b. Lateral condyle fracture with traumatic patellar dislocation
- c. Tibial compound fracture
- d. Septic arthritis

Answer: b

A traumatic knee injury with sudden onset knee pain, swelling, **lateral patellar displacement**, multiple **loose bodies on radiograph** all consistent with patellar dislocation with lateral femoral condyle fracture.

## Physical exam

- large hemarthrosis *If traumatic ( medial structures are ruptured)*
- No swelling ... ligamentous laxity and habitual dislocation
- medial sided tenderness increase in passive patellar translation
- Uncovered medial femoral condyle *With lateral condyle fracture*
- patellar apprehension
- J sign *(Deformity)*

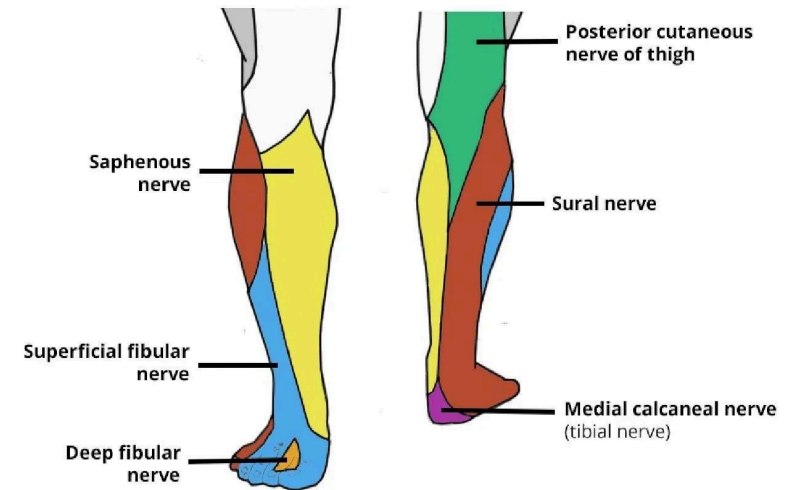


Q11-Compartment syndrome affecting the leg, loss of dorsiflexion, which nerve is mostly affected?

- a. Sural nerve
- b. Sciatic nerve
- c. Tibial nerve
- d. Deep peroneal nerve
- e. Saphenous nerve

Answer: d

- Deep peroneal → dorsiflexion + toe extension + web space sensation (1st–2nd toes)
- Tibial → plantarflexion
- Sural / saphenous → mostly sensory



Q12-Which is true about osteoporosis?

- a. Causes bone pain
- b. Considered a risk factor for osteoarthritis
- c. Defined as bone density  $<2.0$  SD than a young woman
- d. Obesity is a risk factor
- e. Predominantly causes axial fractures

Answer: e

- Vertebral compression fractures are the most common, and classic sites like hip and distal radius may be affected.

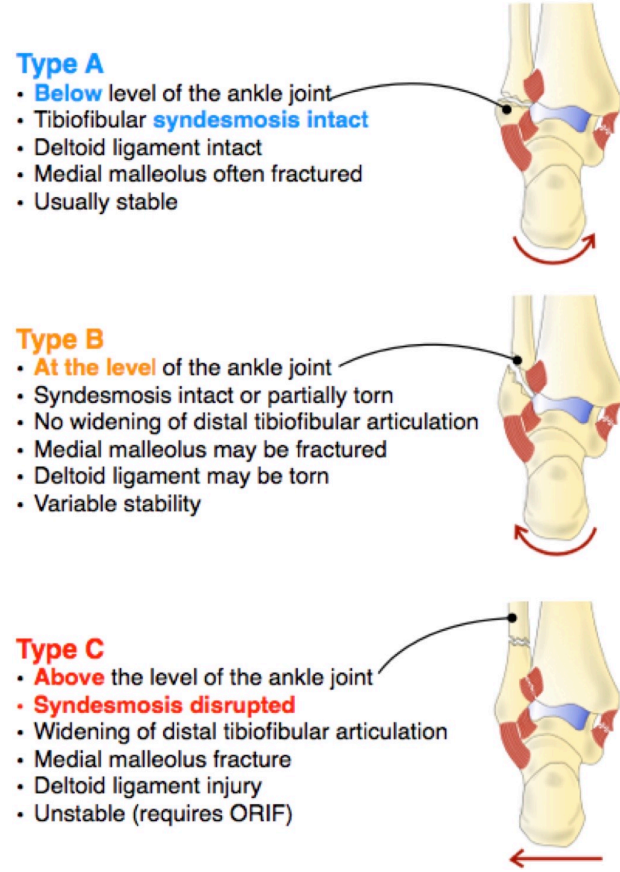
Osteoporosis is an asymptomatic disease ([Answer A](#)). It is defined as a T-score  $\leq -2.5$  SD ([Answer C](#)). It has no direct association with osteoarthritis ([Answer B](#)).

**Risk factors** include being thin ([Answer D](#)), smoking, alcohol use, advanced age, Caucasian ethnicity, female sex, rheumatoid arthritis, and chronic steroid use.

Q13-The structure that determines the stability in ankle fracture is :

- a. Syndesmosis
- b. Articular surface
- c. Anterior talofibular ligament
- d. Calcaneofibular ligament
- e. Posterior talofibular ligament

Answer: a



- Type A**
- **Below** level of the ankle joint
  - Tibiofibular **syndesmosis intact**
  - Deltoid ligament intact
  - Medial malleolus often fractured
  - Usually stable

- Type B**
- **At the level** of the ankle joint
  - Syndesmosis intact or partially torn
  - No widening of distal tibiofibular articulation
  - Medial malleolus may be fractured
  - Deltoid ligament may be torn
  - Variable stability

- Type C**
- **Above** the level of the ankle joint
  - **Syndesmosis disrupted**
  - Widening of distal tibiofibular articulation
  - Medial malleolus fracture
  - Deltoid ligament injury
  - Unstable (requires ORIF)

# Classification and treatment

- Danis-Weber

It classifies lateral malleolus (fibular) fractures based on where the fracture line sits relative to the **ankle syndesmosis**

Q14-Which of the following movements is firstly affected in frozen shoulder ?

- a. Abduction
- b. Internal rotation
- c. External rotation
- d. Extension
- e. All movements

Answer: c

## Frozen shoulder (adhesive capsulitis)

- It is a disorder in which the shoulder capsule **becomes inflamed, stiff and grows together with abnormal bands of tissue, called adhesions.**
- Frozen shoulder is characterized by pain and **loss of motion or stiffness in the shoulder.**
- Pain is usually constant, worse at night, when the weather is colder.
- It affects more women than men. The recovery is very slow.
- **First movement to be lost is external rotation**
- It is idiopathic pathology

Q15-A case of child abuse, which of the following is associated with non-accidental injury ?

- a. Isolated rib fracture
- b. Metaphyseal fracture
- c. Supracondylar humerus fracture
- d. Greenstick fracture

Answer: b

**Important for you as a doctor !**

Child abuse is the 2nd most common injuries in pediatrics. When you might think about child abuse?

**1. Fracture pattern :**

- **Wrinkle fracture** → seen around the growth plate ( metaphysis as in this question) and usually result from twisting injury.
- **Transverse injuries** → in humerus/ femur in child <3 years ( direct trauma)
- **Posteromedial rib fracture**
- **Skull fracture**

**2. Bruises :** most commonly seen in children abuse

**3. No specific pattern can exclude child abuse:** any type of fracture

**4. By history :** patient's age, developmental stage, type & location of the fracture, how old the fracture is? Whether we have multiple fractures with different ages & stage of healing, delay in obtaining medical treatment.

- Other injuries suspicious for child abuse: skin, internal organs. Dr. Omar's notes- fractures in pediatric bone

Q 16-Most important in preventing infection of an open fracture :

- a. Time from wound to irrigation and debridement
- b. Time from wound to emergency room
- c. Time from wound to antibiotics.
- d. Time from wound to surgery
- e. Time from wound to ambulance

Answer: c

**Antibiotics first** → then irrigation/debridement → then definitive surgery.

Q17-Which of the following is true about scoliosis ?

- a. Menarche is an indicator of progression risk of scoliosis
- b. Observation only is the management for 35° degrees scoliosis
- c. It usually starts to progress around the age of 5 years.
- d. The main reason for surgery in her case is cosmetic

Answer: a

- The risk of progression depends on the following parameters:
  1. Growth potential of the patient.
  2. Magnitude of curve
  3. Type of curve
  4. Sex of the patient

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Q18-Which fracture pattern is the slowest to heal?

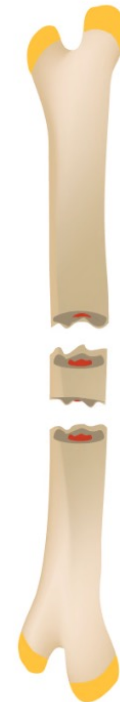
- a. Transverse
- b. Segmental
- c. Oblique
- d. Spiral
- e. Greenstick

## segmental fracture

Answer: b

A **segmental fracture** means the bone is broken in *two separate places*, leaving a “floating” middle piece. That central fragment often has a **compromised blood supply** and poor cortical contact with the main bone ends. Less blood + less stability = slower callus formation and higher risk of delayed union or nonunion.

**Transverse:** less surface area than oblique/spiral, but still far better biology than a devascularized middle segment.



19-Which of the following is a complication of untreated bilateral DDH in toddlers ?

- a. Limping
- b. Pain
- c. Lumbar lordosis
- d. High perineum

Answer: c

***DDH In toddlers, (+after walking): (important !)***

1. Wide perineum in **bilateral** DDH
2. Lumbar lordosis in **bilateral** DDH
3. Trendelenburg's sign and gait.
4. Limping in **unilateral** DDH
5. LLD in **unilateral** DDH

Q20. Elderly with a previous herniated disc years ago, presented to the ER with leg pain, no motor weakness, what's the most likely diagnosis ?

- a. Arterial insufficiency
- b. Disc prolapse.
- c. Lumbar spinal stenosis
- d. Deep vein thrombosis.



Answer: a

Leg pain in elderly with no motor weakness = arterial insufficiency.

- Disk prolapse → neurological signs ( weakness)
- Lumbar spinal stenosis → pain with flexion/ sitting
- DVT → swelling, tenderness, warmth

Q21-A Patient with a total knee replacement presented with infection after three months, the most likely causative organism is :

- a. Streptococcus pyogenes
- b. E. coli
- c. Staphylococcus aureus
- d. Staphylococcus epidermidis
- e. Candida albicans

Answer: d

## **Prosthetic joint infection or Metal (after ORIF) Causative organisms:**

- Early onset (< 3 months of placement): Staph aureus
- Delayed onset (3–24 months of placement): Staph. Epidermidis
- Late-onset (> 24 months of placement): Staph aureus.

Q22. In a 20-year-old male patient who had a shoulder dislocation, what is the most common complication ?

- a. Greater tuberosity fracture
- b. Rotator cuff tear
- c. Bankart lesion
- d. Axillary nerve injury
- e. Chondrolysis

Answer: c

## Complications

### Early

- Old-> rotator cuff tear
  - Middle ages ->Fractures: Greater tuberosity fracture in the anterior dislocation. GT or LT in the posterior dislocation
  - Young->BankArt lesion
- 
- Neurovascular lesion
  - Hill Sachs lesion in anterior dislocation
  - Reverse Hill Sachs in posterior dislocation

## Bankart lesion

### Avulsion of labrum

anterior and inferior glenohumeral ligaments are incompetent.

100% risk for recurrence



Q23-A picture similar to this one, which of the following is true ?



An inherently unstable fracture

Q 24-Which of the following fractures is the best to heal ?

proximal humerus fracture with varus deformity

Q 25-A case of meniscal tear, how would you confirm the diagnosis on physical exam ?

Knee flexion + external or internal rotation

(McMurry test)

Q 26-Patient with carpal tunnel syndrome, what would you find on physical exam ?

Pain upon compression of the wrist

Q 27-Young male with road traffic accident, elbow fracture with injury to the nerve, what's the best management ?

Answer: observe

Note: the question stem had more information about the extent of the injury; **not all radial nerve injuries are treated conservatively**, it depends on the extent of damage

Q 28-Most important prognostic factor in Perthes :

age of presentation + femoral head position

Poor prognostic factors in Perthes disease.

1->6 years old

2-Female: mature earlier with less remodeling potential

3-Obesity

4-Progressive loss of hip motion

5-Advanced stage of disease at diagnosis (B, C), Group B: More than 50% of the lateral pillar height is maintained, Group C: Less than 50%.

c. Group C: Less than 50% of the lateral pillar height is maintained.

6-Advanced grade (loss of containment).

Q 29-A case of disc herniation at L2-L3, what is expected to be found on physical exam ?

Negative straight leg raising test

+L2–L3 disc → compresses L3 root

Quadriceps weakness

Reduced patellar reflex

(SLR is mainly positive in L4–S1 radiculopathy)

Q 30-Which of the following is an avulsion fracture ?

Avulsion fracture of the ischial tuberosity

Q 31. distal femur fracture, which one is the worst in healing ?

Salter-Harris V

Q 32-An X-ray of a femur showed a small, well-circumscribed radiolucent lesion surrounded by a dense sclerotic rim within the cortex. The lesion measures less than 1.5 cm in diameter and is associated with intense nocturnal pain that is **relieved by nonsteroidal anti-inflammatory drugs (NSAIDs)**. What is the most likely diagnosis based on these findings?

Osteoid osteoma

Q 33. Femoral head vs intertrochanteric fracture?

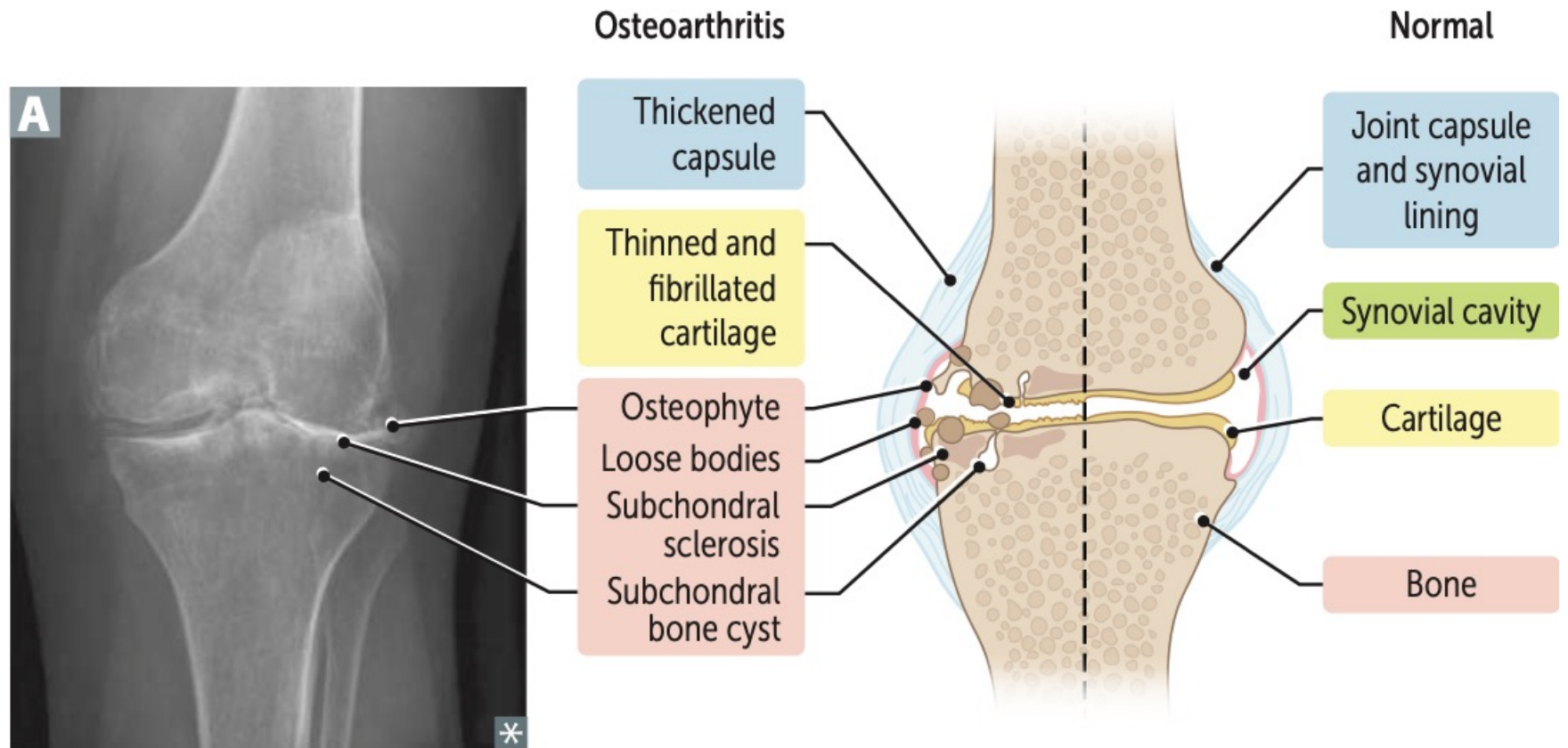
The risk of non-union is higher in femoral head fractures.

2022

Q1. Osteoarthritis in the knee, x-ray will show all the following, except:

- a. Cyst formation
- b. Osteophyte
- c. Periarticular osteopenia
- d. Subchondral sclerosis
- e. Narrow space joint

Answer: c



Q.2 All are considered a risk factors for osteoarthritis except:

- a. Osteoporosis.
- b. Age
- c. Obesity
- d. Female gender
- e. Joint trauma

Answer: A

Q3. One of the following is a symptom of an advanced carpal tunnel syndrome:

- a. Total numbness (anesthesia)
- b. Objects falling from the hand
- c. History of diabetes
- d. Sleep disturbances due to pain
- e. Paresthesia

Answer: b

Signs & symptoms of severe carpal tunnel syndrome:

1. Thenar atrophy /wasting.
2. Tinel sign within 3-seconds.
3. Motor deficit & weakness.
4. Nerve conduction studies indicate severity.

Dr.Aws's lecture notes

Q.4 One of the following fracture patterns is expected to be the best in healing ?

a- Transverse

b- segmental

c- oblique

d- comminuted

Answer: C

Oblique fracture → largest contact area

Q.5 Elderly with peptic ulcer have not respond to analgesia for knee pain, your management would be:

- a. increase dose of analgesia
- b. knee arthroplasty
- c. Intra-articular corticosteroid injection
- d. Physiotherapy

Answer: b

Patient's history of peptic ulcer disease makes high doses of NSAIDs contraindicated (Answer A). Intra-articular corticosteroid injections as well as physiotherapy are usually indicated for mild to moderate OA (Answer C & D). A patient who didn't respond to analgesia initially, is more likely to suffer from severe OA.

The best next step for **failed conservative therapy** in elderly patient is knee arthroplasty.

Further explanation:

**Best initial treatment:** Physical therapy, weight reduction (if comorbid obesity present), and NSAIDs. Intra-articular corticosteroid injections may provide temporary relief.

**Most definitive treatment:** Surgery—consider joint replacement (eg, total hip/knee/shoulder arthroplasty) in advanced cases. Patients are at higher risk for developing osteoporosis. **USMLE STEP 2CK**

The recurrence of ulcer complications with continued use of oral nonsteroidal anti-inflammatory drugs (NSAIDs) is well established and is contraindicated when treating OA patients with active peptic ulcer disease (eg, active bleeding or perforation). **UpToDate**

Q 6. False about children skeleton in comparison to adults:

a- better growth

b- better healing

c- specific fracture

d- comminuted fracture more

Answer: d

The pediatric bone is significantly less dense and **more porous**, it has a **lower modulus of elasticity**; which is a measurement of bone stiffness & has a **lower bending strength**.

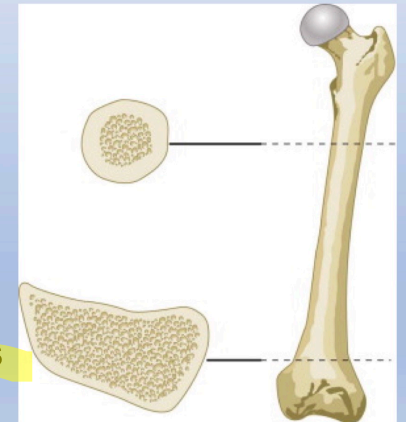
This allows more energy absorption before bone failure. The higher the porosity the higher is the prevention of fracture propagation as well as decreasing the incidence of comminuted fractures which are commonly seen in adults.

Dr. Omar's notes- fractures in pediatric bone

## Fractures in Pediatric skeleton

- Increased cancellous bone reduces tensile strength  
reduces tendency of fracture to propagate

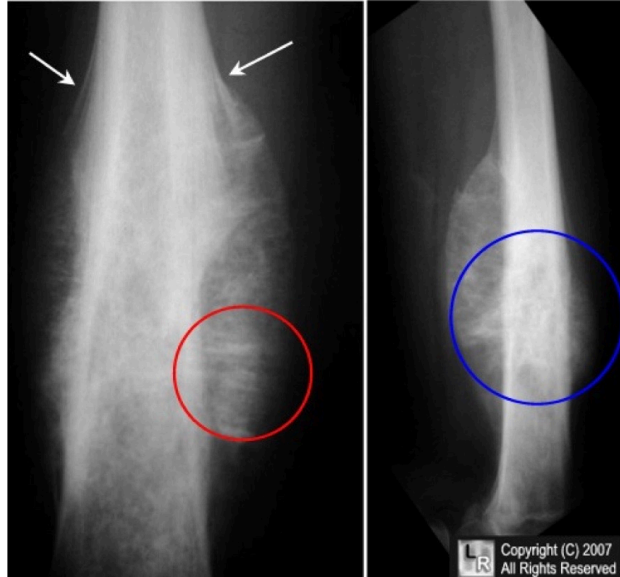
✓ Less comminuted fractures



Q.7 Codman triangle on x-ray, indicates :

- a. Osteosarcoma
- b. Osteocondroma
- c. Osteoma
- d. Chondrosarcoma

Answer: A



## Osteosarcoma

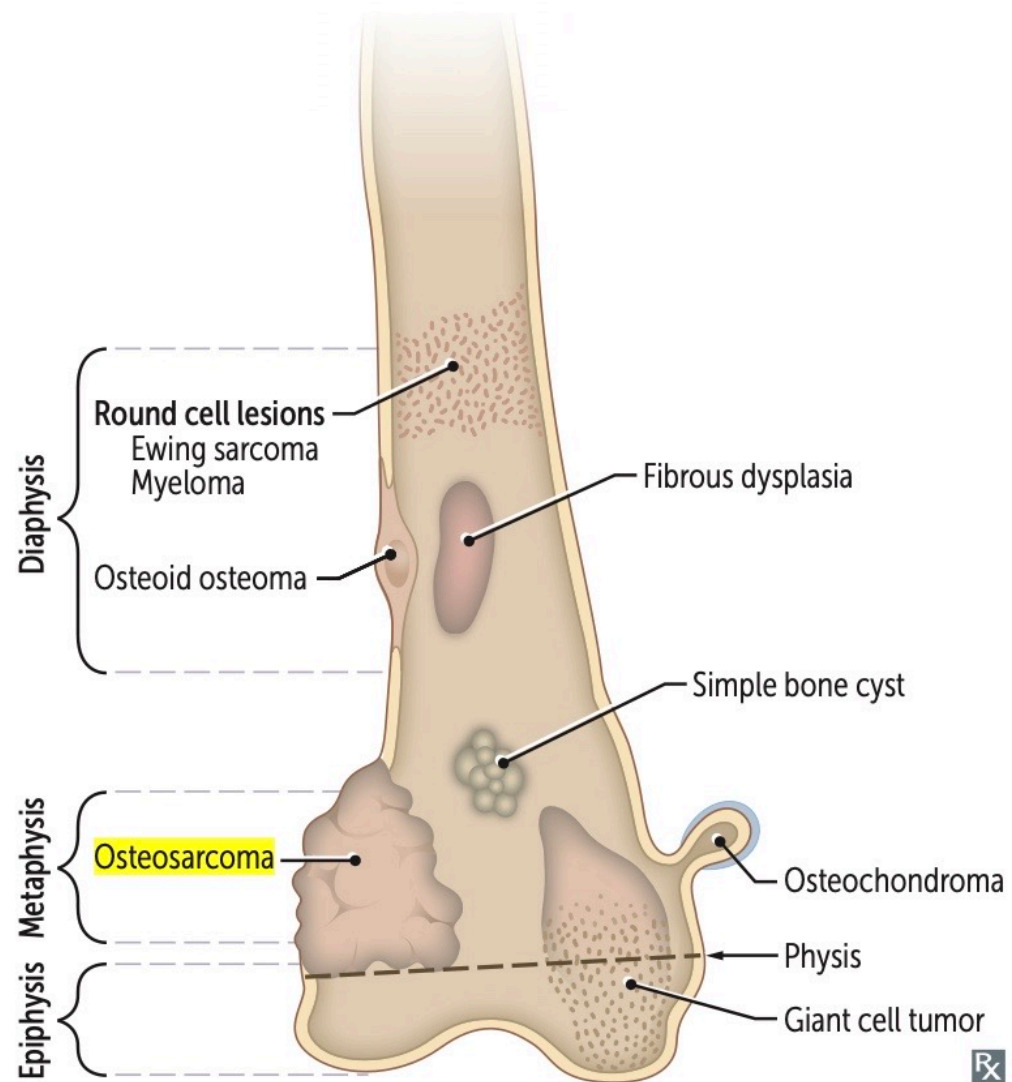
- Typically occurs in the metaphysis around the knee in adolescents.
- Classically high grade lesions.
- Note the sunray appearance (red and green circles).
- Note also Codman's triangle (arrows).

## Osteosarcoma

- Notice the ill defined margins of this mainly sclerotic lesion.
- Note also the solid periosteal reaction.



## Primary bone tumors



Q8. Mostly seen in a child above 3 years with bilateral DDH ?

- a. Wide perineum
- b. Ortolani test is positive
- c. Leg discrepancy
- d. Limping

Answer: A

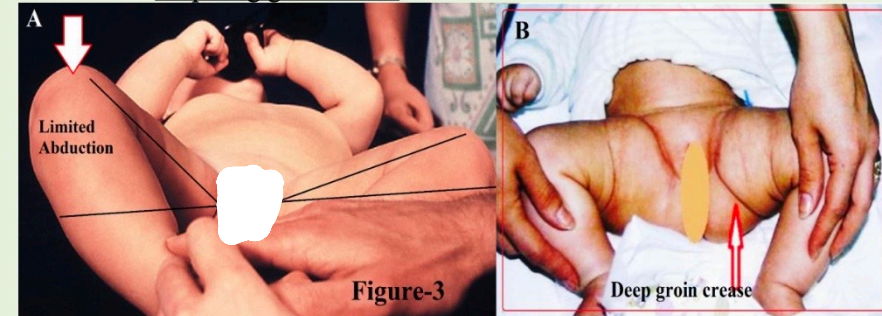
While limbing & leg discrepancy are features of DDH in toddlers, they are more likely to be presented in unilateral rather than bilateral DDH.

Ortoloni test is done in neonates and not recommended in older children.

**A. In the neonatal period**, (<6 months), e.g., Ortolani test, (Barlow test is not recommended).

**B. In infants older than six months** –walking,

- \* Limitation of abduction (>20°), most sensitive test for DDH,
- \* Apparent limb shortening in unilateral DDH.
- \* Abnormal deep long groin crease.



**C. In toddlers**, (+after walking)

- \* **Wide perineum** in bilateral DDH
- \* Lumbar lordosis in bilateral DDH
- \* Trendelenburg's sign and gait.
- \* Limping in unilateral DDH
- \* LLD in unilateral DDH

Q9. Question about dislocated patella .. with hemarthrosis and floating fragments .. the origin of these fragments?

- a. Medial patellar facet.
- b. Lateral patellar facet.
- c. Medial femoral condyle
- d. Medial patellofemoral ligament

Answer: a

The **medial patellar facet** is the **most common** site of osteochondral fracture.

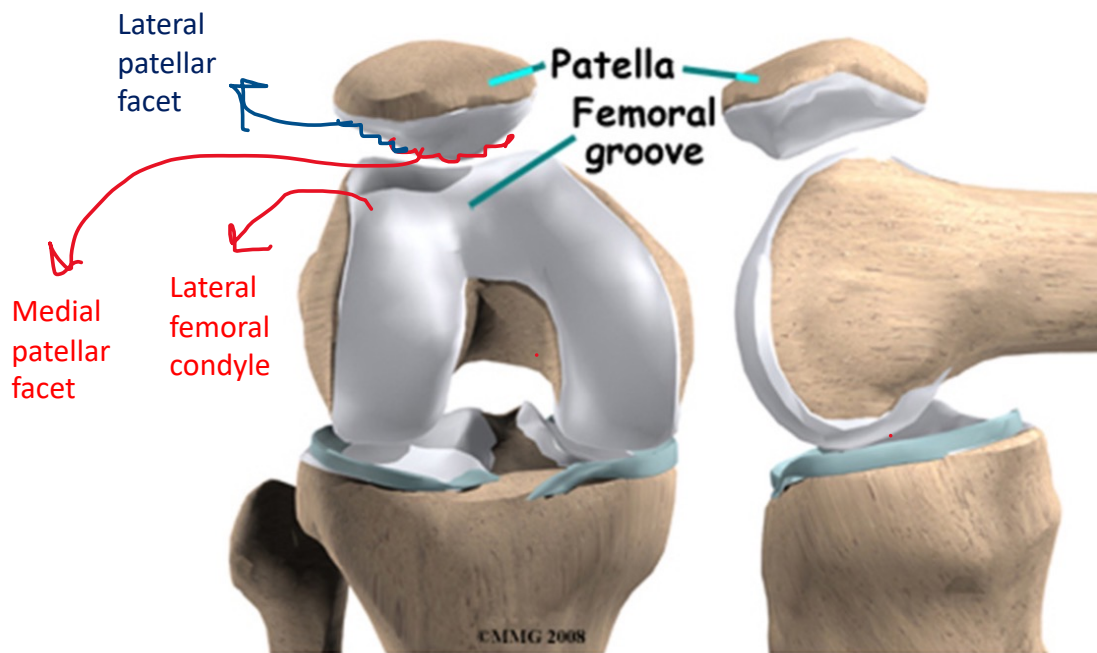
As it dislocates and then **reduces back**, the **medial facet** of the patella slams into the **lateral femoral condyle**. This is the main collision.

A matching lesion may appear on the lateral femoral condyle

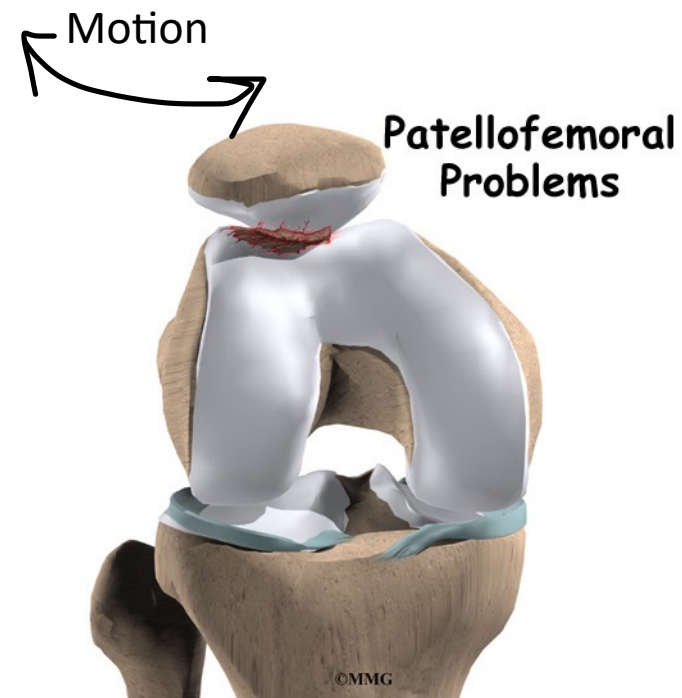
The fragments you see floating in a hemarthrotic knee usually come from **one of these two surfaces**.

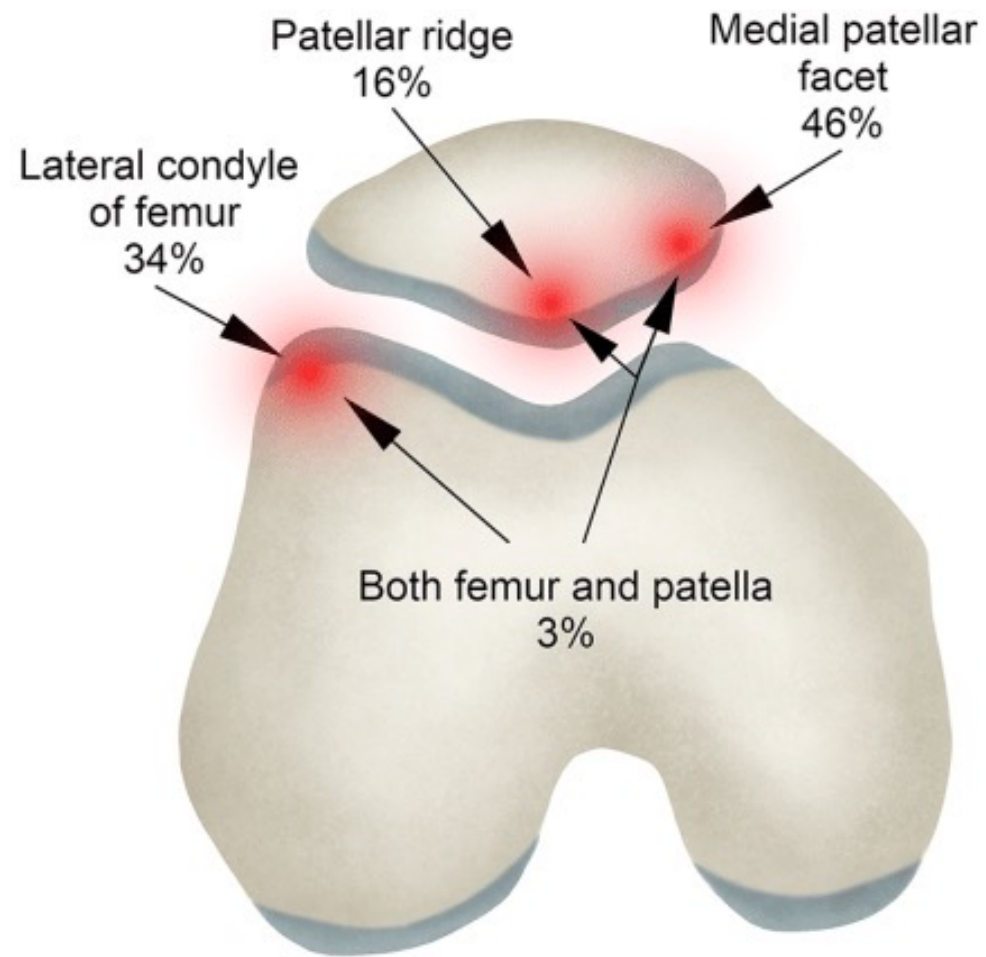
Dr. Mohammad Hamdan notes and ChatGPT

## Normal knee



## Lateral patellar dislocation





**Distribution of osteochondral fracture locations in an axial view**

Q.10-Scenario about : Fragmentation and focal resorption of the femoral epiphysis, and minor subluxation ,....diagnosis ?

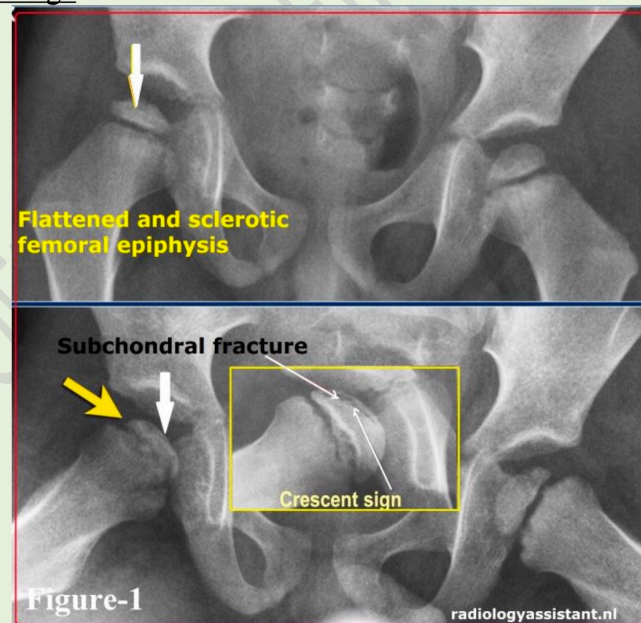
- a. Developmental dysplasia of the hip (DDH)
- b. Slipped capital femoral epiphysis (SCFE)
- c. Legg-Calvé-Perthes disease (LCPD)

Answer: c

## Legg-Calvé-Perthes disease (LCPD)

### Radiographic Feature (according to the stage)

- Widening of the joint space and **minor subluxation**
- Sclerosis
- Caffey's sign (Salter), a **subchondral #** (Crescent sign) on lateral X-ray, (an anterolateral aspect of the femoral capital epiphysis).
- **Fragmentation and focal resorption of the epiphysis.**
- Loss of epiphyseal height.
- Widening of the femoral neck & head (coxa magna).
- Lateral uncovering of the femoral head.
- Metaphyseal cyst formation.
- Sagging rope sign in adults.



Q.11 False about slipped femoral capital epiphysis:

- A. more in Females
- B. 70% gradual in onset
- C. Lateral view is important in diagnosis
- D. Affected Limb is externally rotated

Answer: a

### III. Slipped Capital Femoral Epiphysis SCFE

#### 1-Definition

A displacement through the growth plate of the immature hip occurs during the rapid growth period in the hypertrophic zone of the physis. The femoral head remains in the acetabulum; the neck displaces anteriorly and rotates externally.

#### 2-Epidemiology

- Most common disorder of the hip in adolescents.
- > Male (12–14 years)
- Unilateral (80%),
- Obese hypogonadal male (adiposo genital syndrome), or excessively thin and tall.

**3-Etiology and PF:** Idiopathic, but in general, weakness of the perichondral ring.

#### Conditions that weaken the physis

##### \* Endocrinopathies

If the patient is <9 years or >16 years and has a retarded bone age or short stature.

\* **Systemic diseases** such as chronic renal failure.

\* **Mechanical factors** increase the load across the physis → SCFE.

- Overweight children*
- Increase in femoral retroversion.*
- Decreased femoral anteversion* and femoral neck-shaft angle.
- Vertically oriented physal plate.*
- Thinning of the perichondral ring.*

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#### 4-Pathology

The physis abnormally widened with the irregular organization. The slip occurs through the hypertrophic zone of the physis.

#### 5-Evaluation

##### 1. Clinical presentation

- Alimp and pain in the groin, hip, thigh, or knee region, (Unexplained antalgic limp).
- Pain in the distal thigh and/or knee region in 30% of cases.
  - Symptoms are usually present for weeks- months before a diagnosis is made.

##### 2. Physical examination,

- Abnormal gait (antalgic), waddling gait in bilateral cases, and decreased ROM (flexion and internal rotation).
- Obligatory external rotation**, i.e., ER of the hip as the hip is brought into flexion.
- Walking with the externally rotated foot.

##### 3. Diagnostic tests

**a. Plain radiographs**—Standard AP and frog-leg lateral views of the pelvis.

\* Widening and irregularity of physis (appears woolly, earliest sign).

\* Decreased epiphysis height (slipped posteriorly).

\* **The Klein line**, a line tangential to the superior border of the femoral neck on the AP view intersects the proximal femoral epiphysis in a normal hip. SCFE fails to intersect the proximal femoral epiphysis.

Frog lateral radiographs are more sensitive in detecting an SCFE.

\* **Trethowan's sign** is when Klein's line does not intersect the lateral part of the superior femoral epiphysis on an AP radiograph of the pelvis.

Q.12 The classic presentation of patient with subtrochanteric fracture:

- a. Adduction and extension of proximal fragment
- b. Abduction and extension of proximal fragment
- c. Predominantly internal rotation of proximal fragment
- d. Adduction and flexion of proximal fragment
- e. Abduction and flexion of proximal fragment

Answer: e

Iliopsoas  $\Rightarrow$  flexion

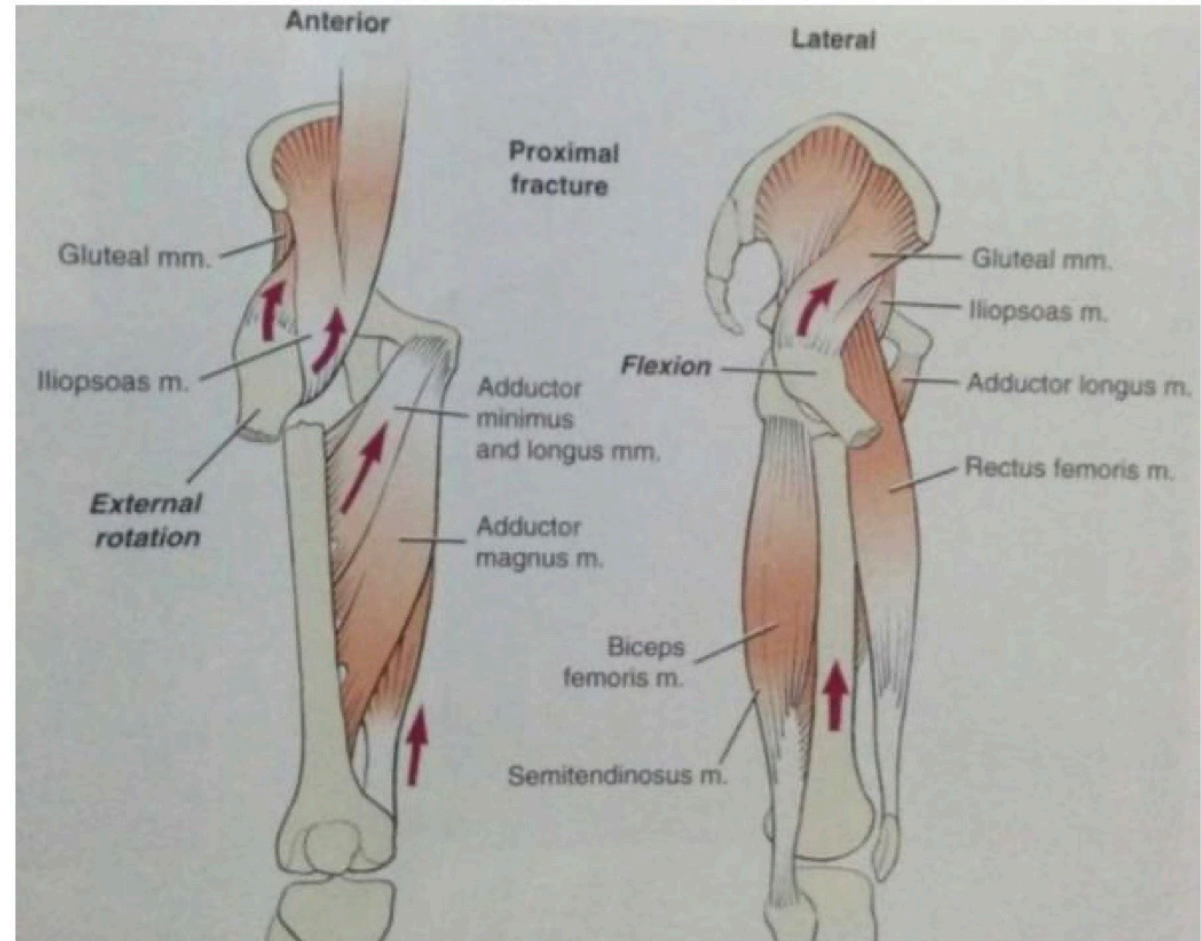
Gluteus Medius/minimums  $\Rightarrow$  abduction

Gluteus maximus  $\Rightarrow$  external rotation.

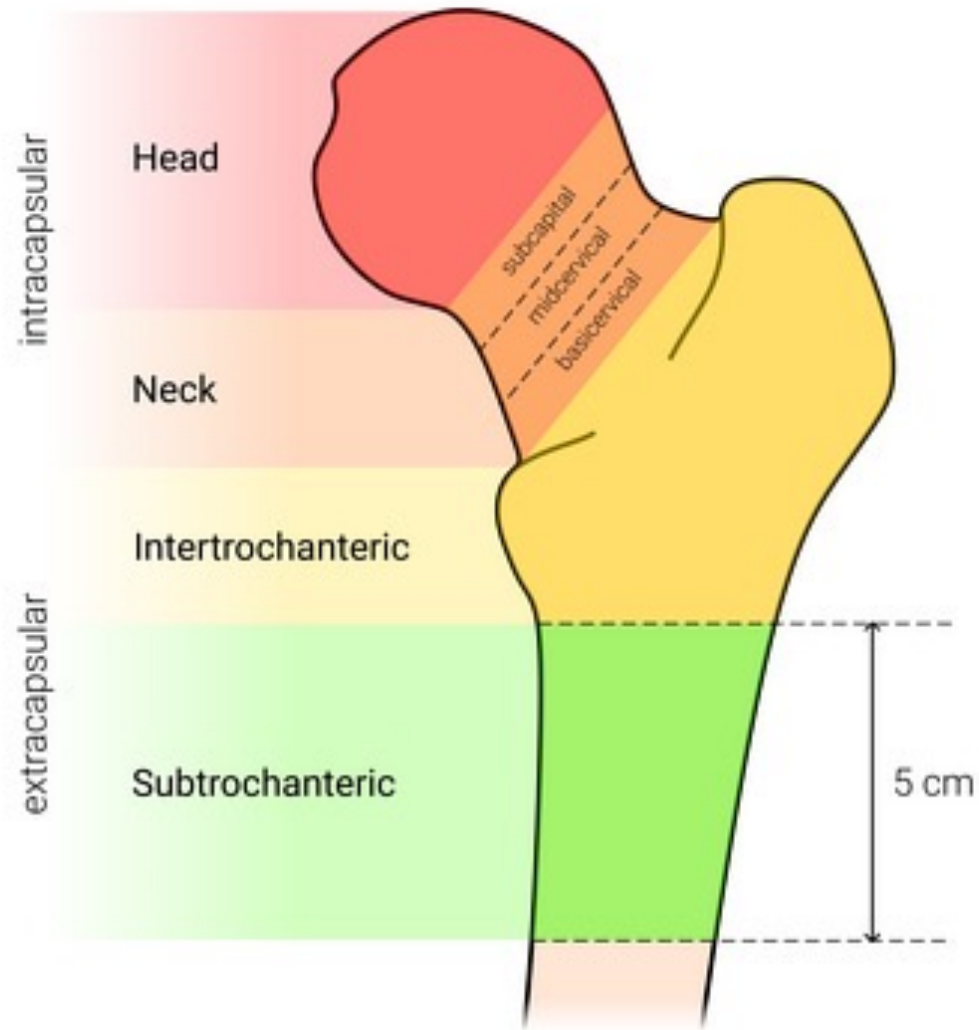
Proximal piece  $\Rightarrow$  Abduction + flexion

Distal piece  $\Rightarrow$  Adduction + Varus

**This causes shortening of the limb.**



# Regions of the proximal femur



Q.13 The structure that determine the stability in ankle fracture is:

- a. syndesmosis
- b. articular surface
- c. Anterior talofibular ligament
- d. calcaneofibular ligament
- e. Posterior talofibular ligament

Answer : a

#### Type A

- **Below** level of the ankle joint
- Tibiofibular **syndesmosis intact**
- Deltoid ligament intact
- Medial malleolus often fractured
- Usually stable



#### Type B

- **At the level** of the ankle joint
- Syndesmosis intact or partially torn
- No widening of distal tibiofibular articulation
- Medial malleolus may be fractured
- Deltoid ligament may be torn
- Variable stability



#### Type C

- **Above** the level of the ankle joint
- **Syndesmosis disrupted**
- Widening of distal tibiofibular articulation
- Medial malleolus fracture
- Deltoid ligament injury
- Unstable (requires ORIF)



## Classification and treatment

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- Danis-Weber

Q14. A 15-year old female patient is being assessed for scoliosis that was noticed 2 years ago, her curve measure 65 degrees. How would you counsel her with regards to this deformity?

- a. Neurological exam is not mandatory in idiopathic scoliosis
- b. Pain is rare with this type of deformity
- c. She doesn't need treatment as it is unlikely that this curve will progress
- d. A type 5 riser sign indicates that this patient is skeletally mature
- e. main goal of surgery if to be done is cosmetic

Answer: d

**Risser's sign** is an indirect measure of skeletal maturity, on a scale of 5, where the grade of 5 means that skeletal maturity is reached. (next slide)

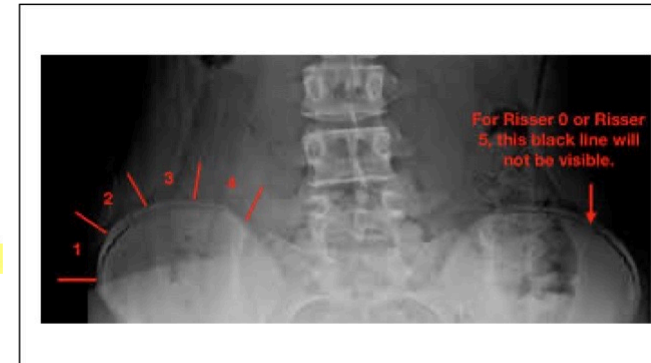
History and physical exam are mandatory to exclude congenital & neuromuscular types ( answer A).

A 65° indicates severe scoliosis that is associated with future cosmetic, functional and possibly cardiopulmonary issues that needs surgery, the main goal of surgery is to prevent progression. (answer C &E).

While pain is not typically associated with adolescent idiopathic scoliosis, the patient has not been confirmed to have the idiopathic type; therefore, other causes such as neuromuscular/ congenital scoliosis remain possible. Making answer D the ideal choice.

## SKELETAL MATURITY – RISSER'S SIGN

- Indirect measure of skeletal maturity, whereby the ossification stage of iliac apophysis is used to judge the ossification of spinal vertebra. On a scale of 5, it gives a measure of progression of ossification; **the grade of 5 means that skeletal maturity is reached.**
  - The curve of scoliosis often progresses most during the period of rapid skeletal growth and maturation.
  - The iliac apophysis start ossifying shortly after puberty.
  - Ossification extends medially and, once the iliac crests are completely ossified, further progression of the scoliosis is minimal (Riser's sign).
  - This stage of development usually coincides with fusion of the vertebral ring apophysis. 'Skeletal age' may also be estimated from x-rays of the wrist and hand.
1. Grade 1 → when the ilium (bone) is calcified at a level of 25%; it corresponds to prepuberty or early puberty.
  2. Grade 2 → when the ilium (bone) is calcified at a level of 50%; it corresponds to the stage before or during growth spurt.
  3. Grade 3 → when the ilium (bone) is calcified at a level of 75%; it corresponds to the slowing of growth.
  4. Grade 4 → when the ilium (bone) is calcified at a level of 100%; it corresponds to an almost cessation of growth.
  5. **Grade 5 → when the ilium (bone) is calcified at a level of 100 % and the iliac apophysis is fused to iliac crest; it corresponds to the end of growth.**



Q.15 A Basketball player developed immediate swelling of the medial knee after a rebound fall, what is the structure most likely to be injured is:

A. MCL

B. ACL

C. Meniscus

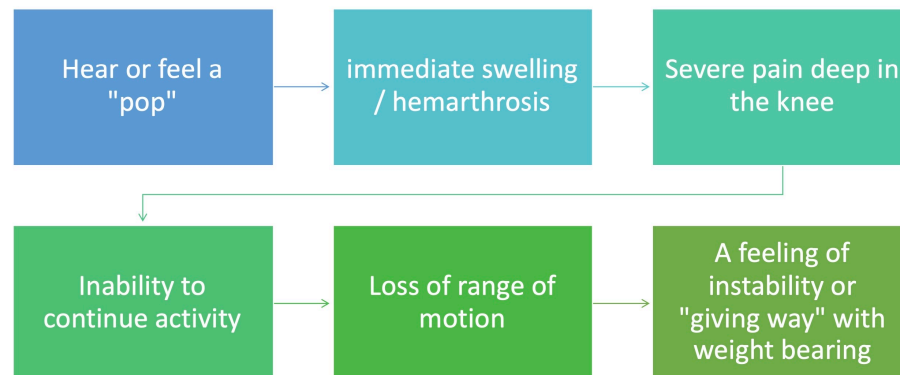
Answer: b

Nearly all patients with an acute ACL injury manifest an **immediate knee effusion** from hemarthrosis. (Symptoms of ACL injury below)

MCL tear is associated with medial pain and tenderness rather than knee swelling (Answer A).

Patients with meniscal tear have delayed knee swelling (Answer C).

#### Symptoms of ACL injury



Q16. question about intertrochanteric fracture :

female (risk of osteoporosis)

Q17.Tillaux fracture:

fracture of the anterolateral distal tibia epiphysis ... ( Transitional fracture , SH type III)

It's a transitional fracture of adolescents, Salter Harris type III of distal tibia.

The distal tibial physis has a peculiar pattern of closure, it closes first centrally, then posteromedially and **finally anteriolaterally**. This occur at ages 14-16 years.

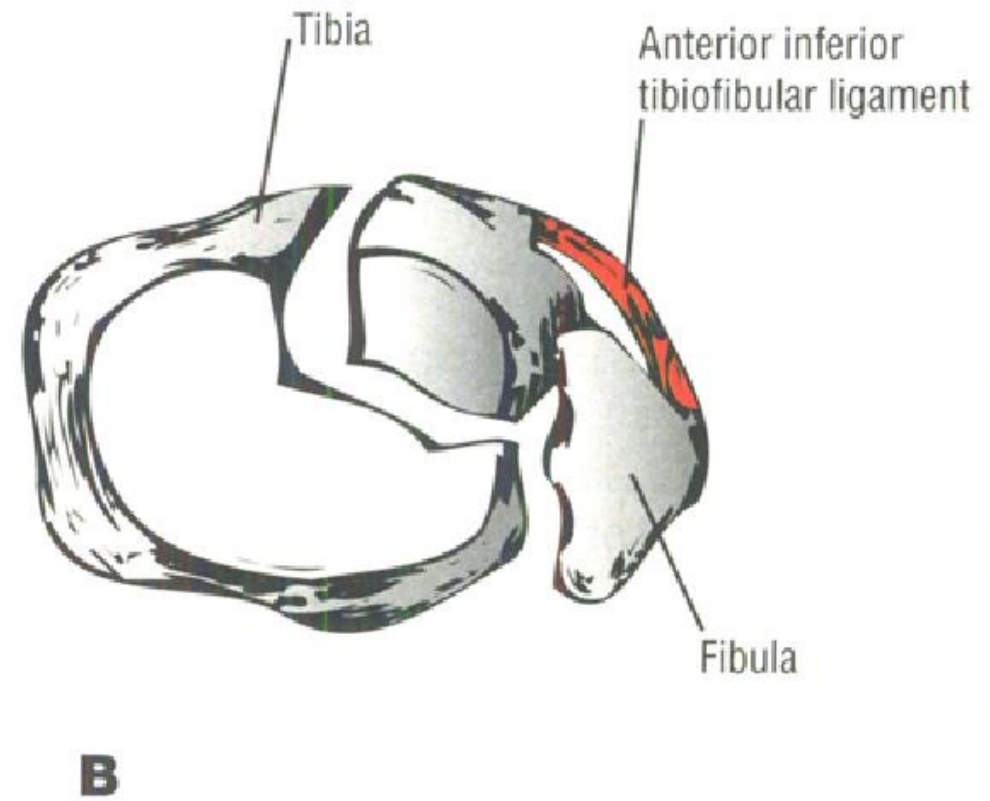
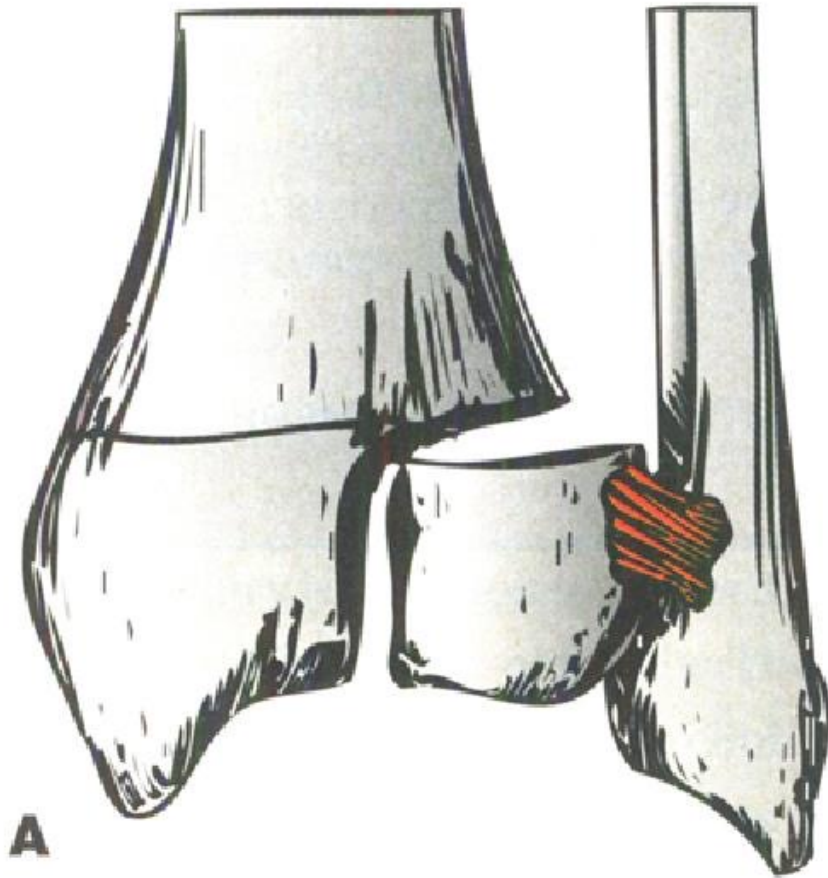
Closure of medial physis earlier than the lateral attachment of anterior inferior tibiofibular (AITF) ligament.

When an external rotation injury tightens the anterioinferior tibufibular ligament, avulsion of the last open antero-lateral epiphysis happens due to greater strength of ligament compared with bone.

It's a bi-planer fracture: sagittal and coronal plans.

Needs open reduction and screw fixation

# Tillaux fracture



Q18. question about best & early treatment of clubfoot:

something about bracing to decrease progression .

Q19. 30 years old man with tibial fracture:

Open reduction and internal fixation

Q 20. question of a 70-year-old woman fall on wet floor?

Fracture of femur shaft

2021

Q1. Mortality with hip fracture in the elderly is highest with which comorbidity:

- a. BMI of 35.
- b. Renal failure.
- c. Diabetes.
- d. High blood pressure.
- e. Smoking.

Answer:b

Obesity, DM, hypertension & smoking all increase risk of complications and may delay healing of hip fracture (Answer A, C, D, E).

However, the impact on mortality might be **higher** and **strongly associated** with **organ failure** (renal failure).

Q 2. In unconscious patient, the spinal injury is assessed by one of the following:

- a. Spinal tenderness
- b. Absence of response to painful stimulus
- c. Absence of deep reflexes
- d. Inspection of the back of patient
- e. Moving upper and lower limbs of the patient

# Spinal Trauma

Source : Dr.Fadi El Haddadi

- Vertebral column fractures are common but they are usually missed due to ATLS system ; because spine is reached in the secondary survey. And in the secondary survey, usually there is other more severe injuries other than the spine
- In high energy trauma you should expect spinal injury until proven otherwise, especially if the patient is comatosed. If the patient is conscious ask him\her about back pain and examine him\her.
- As in spinal disorders, kyphosis is stable, but lordosis is unstable.
- Most fractures happen in the junctional areas (transition between kyphosis and lordosis; cervicothoracic and thoracolumbar → T10-L2 are the most common site → 65%), T11-12 are the most unstable site in the spine → increased risk of fracture
- In Males more than the females.
- Suspect spinal fracture in comatosed pt and in major trauma
- Major consequence → paralysis.
- Fractures can be due to:
  - **High** energy trauma: more in young age, examples (RTA, falling down, gun shot)
  - **Low** energy trauma: more in elderly, examples (weak bone due to osteoporosis with small trauma)
- Approach (hx+ physical + investigation) :
  - **History:**
    - Mechanism of injury → you should ask about the details of RTA : if the patient was in a car or pedestrian (more severe), type of car (old or new, large or small), front seater (affected more) or back seater (less affected), model of the car (to know about the seatbelt and airbags), ask about the status of the other people who was involved in the accident, type of car that hit the driver
  - When approach in ABCDE, “ D=Disability”, ask about weakness, numbness, paresthesia in UL+LL
  - **Physical examination:**
    - inspection: look for bruises, hematoma and deformities, if open fracture look for wound
    - palpation: tenderness or crepitations (find the area of maximum tenderness to orient the x-ray imaging). Then order a spine x-ray where the point of maximum tenderness at the center of the x-ray

Answer: d

Q3. One of the following fracture patterns is expected to take the longest time to heal:

- a. Buckle.
- b. Oblique.
- c. Spiral.
- d. Greenstick.
- e. Transverse.

Answer: e

## General Principles

- Most upper limb fractures result from falling down on an outstretched hand (FOOSH).
- This will cause either a bending force resulting in an oblique fracture, a twisting force resulting in a spiral fracture, or a direct force (hitting an object) resulting in a transverse fracture.
- Transverse fractures result from the highest energy injuries causing more soft tissue damage, thus requiring a longer time to heal opposed to oblique or spiral fractures.
- When interpreting the displacement pattern of the fracture, think of muscle pull, the direction of the causative injury, and gravity.

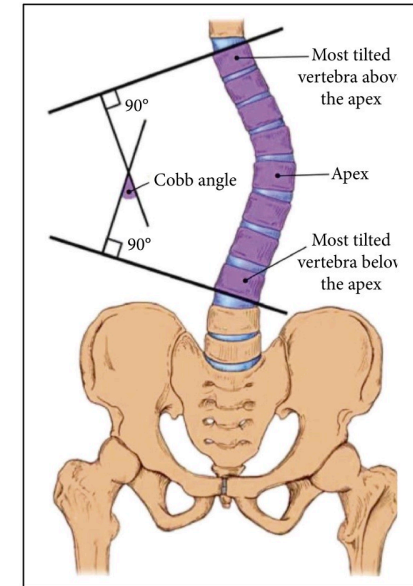
Q4.Measurement of the curve severity of an adolescent idiopathic scoliosis by:

- a. Perkin's angle.
- b. Vertebral Scapular angle.
- c. Cobb's angle.
- d. Vertebral Sacral angle.
- e. Vertebrocostal angle

Answer: c

### Cobb's angle

- Full-length PA and lateral x-rays of the spine and iliac crests must be taken with the patient erect.
- The degree of curvature is measured by drawing lines on the x-ray at the upper border of the uppermost vertebrae of the curve and the lower border of the lowermost vertebrae of the curve; The angle between intersecting lines drawn perpendicular to the top of the top vertebrae and the bottom of the bottom vertebrae is the Cobb angle “the angle of curvature”
  - Mild → 10 - 30°
  - Moderate → 30 - 45°
  - Severe → >45°
- If 50-90 → needs surgery to prevent progression
- <50 → conservative
- Right thoracic curves are the commonest, the great majority in girls in adolescent idiopathic scoliosis. → the apex to the Rt side → to the opposite side of heart
- Left thoracic curves are so unusual that if seen they should be further investigated by MRI to exclude spinal tumors.
- Primary thoracic curves are usually convex to the right, lumbar curves to the left.



Q5. The highest fracture remodeling capacity would be in a:

- a. Humeral shaft fracture in a 10-year-old boy.
- b. Intertrochanteric fracture in a 75-year-old man.
- c. Surgical neck humerus fracture in a 65-year-old lady.
- d. Tibial shaft fracture in a 40-year-old lady.
- e. Distal radius fracture in a 4-year-old girl.

Answer: e

# Fractures in Pediatric skeleton

## The power of remodeling

Factors affecting remodeling potential of ALL Pediatric #

- **Years of remaining growth** – **most important factor**
- **Position in the bone** – the **nearer to physis** the better the remodelling
- **Plane of motion** –  
greatest in sagittal, the frontal, and least for transverse plane
- **Physeal status** – if damaged, less potential for correction Salter harris III-V
- **Growth potential of adjacent physis**  
e.g. proximal humerus better than distal humerus  
& **distal radius better than proximal radius**

Next slide ←

Notes from dr. Omar Samara's lecture :

**Plane of motion** refers to the relationship between the direction of fracture **angulation** and the **plane of movement** of the adjacent joint. If the direction of fracture angulation lies in **the same plane** as the joint's normal range of motion, remodeling potential is better, and vice versa.

Ex: In supracondylar fractures of the humerus, dorsal (posterior) angulation occurs in the sagittal plane. Because the elbow primarily moves in flexion and extension (which also occur in the sagittal plane), this deformity can remodel over time through normal joint motion.

On the other hand, if an elbow fracture is angulated in the coronal plane (varus or valgus deformity), remodeling is poor because elbow motion does not significantly occur in that plane. In such cases, spontaneous correction is unlikely, and surgical intervention is usually required.

Q 6. Which best describes neglected complete dislocation in developmental hip dysplasia (DDH) in a 3-year-old child?

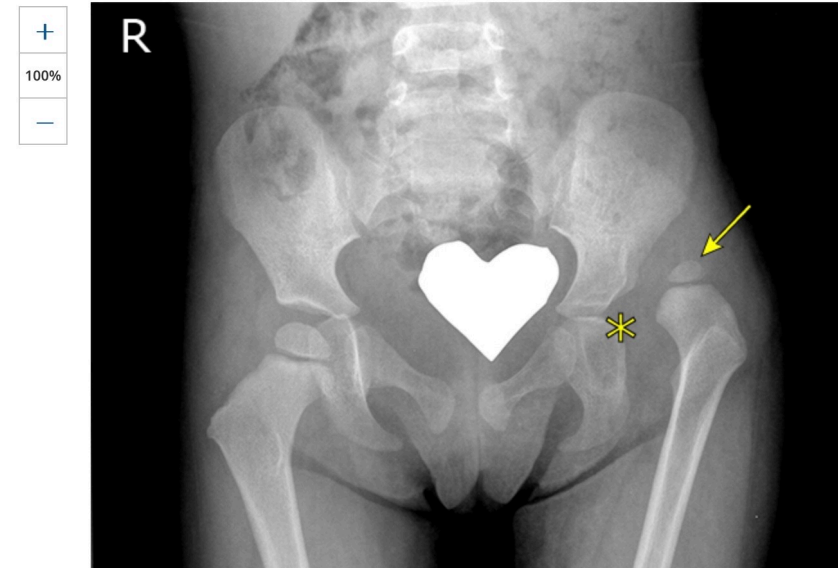
- a. Normal ossification of capital epiphysis.
- b. Round femoral head.
- c. Neck shaft angle is less than 110 degrees.
- d. Femoral head is pulled superiorly & laterally by hip adductors.
- e. Anteversion of head and neck of femur

Answer: e

With or without full dislocation, the hip can develop dysplastic changes. Most commonly, the result is a shallow acetabulum with decreased anterior and lateral coverage of the femoral head. There also can be **asphericity** of the femoral head ([Answer B](#)), a valgus neck-shaft angle, ([Answer C](#)) and **persistence of excess femoral anteversion**.

The femoral head in DDH is indeed superolaterally displaced, mainly due to **acetabular dysplasia**, capsular laxity, and muscle imbalance ( rather than physically pulling the head superiolaterally) ([Answer D](#))

Hip dysplasia radiograph



This frontal view of the pelvis demonstrates complete superolateral dislocation of the left femoral head (arrow). The left acetabulum is shallow (asterisk). Note the smaller size of the femoral epiphysis on the dislocated left side. The right hip is normal. The heart shape is a lead shield protecting the ovaries.

Q7. A 13-year-old girl had a knee x-ray after injuring her knee while playing volleyball. It showed a lesion in the distal femoral metaphysis. The presence of which of these radiological findings favors a benign entity over a malignant one:

- a. Wide transition zone.
- b. Well-defined margins.
- c. Cortical destruction.
- d. Lytic lesion.
- e. Sunray appearance.

Answer: b

### Benign lesions:

- Could be lytic, sclerotic, or mixed.
- Well defined margins (narrow transition zone).
- A sclerotic rim could be present (indicates a long standing stable lesion).
- No cortical destruction (although a fracture might be present). Some lesions cause thinning or ballooning of the cortex.
- No periosteal reaction.

### Malignant lesions:

- Could be lytic, sclerotic, or mixed.
- Ill defined margins (wide transition zone).
- Cortical destruction.
- Periosteal reaction.
- A soft tissue mass (shadow) can sometimes be seen.

Q8. A 65-year-old male patient had a direct fall on his right shoulder. Now he cannot abduct or do forward flexion. The most common tendon to be torn is:

- a. Subscapularis
- b. Long head of biceps
- c. Deltoid
- d. Supraspinatus
- e. Infraspinatus

Answer: d

The **supraspinatus** is the most commonly torn tendon, even with relatively minor trauma; Due to poor blood supply and degenerative changes. DR Aws said: any question about shoulder muscles or tendons the answer is **supraspinatus** بدون ما تفكر

---

### Arm abduction

DEGREE	MUSCLE	NERVE
0°–15°	Supraspinatus	Suprascapular
15°–90°	Deltoid	Axillary
> 90°	Trapezius	Accessory
> 90°	<b>Serratus Anterior</b>	<b>Long Thoracic (SALT)</b>

---

Q9 Which of the following physical exam maneuvers would be most expected for a patient with a Second's fx on his radiograph:

- a. Positive McMurray's test with leg internally rotated
- b. Positive McMurray's test with leg externally rotated
- c. positive Lachman test
- d. Positive external rotation dial test with knee flexed at 30 degrees
- e. Positive external rotation dial test with knee flexed at 30 degrees and 90 degrees

Answer: c

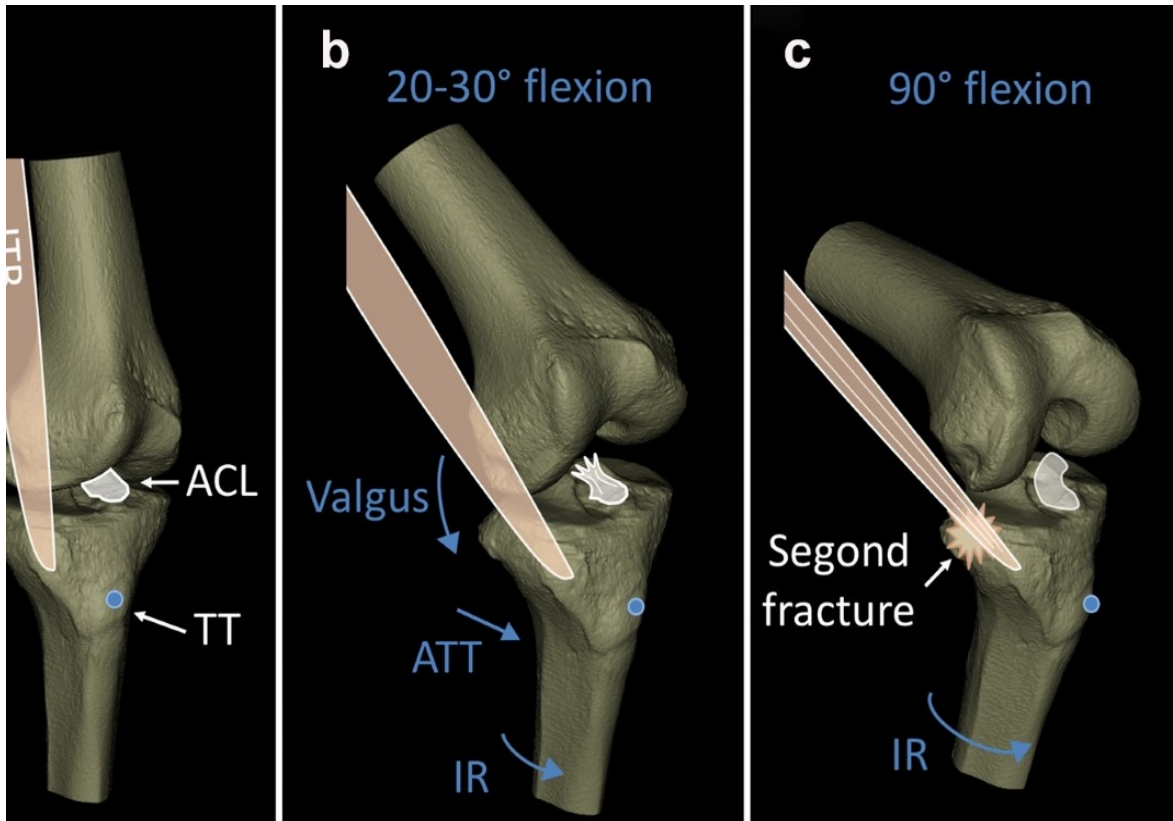
**Segond's fracture** : avulsion fracture of the lateral tibial plateau, [next slide](#), if present, 95% there is ACL injury.

Special tests for ACL injury: anterior drawer test, **lachman's test** (most sensitive) & pivot test.

**McMurray's tests** (internal or external rotation) are about **meniscal** tears. ([Answer A/B](#)).

The external rotation dial test checks the posterolateral corner ([Answer D/E](#)).

# Segond fracture



Q10. A 50-year-old female patient with right hallux valgus deformity, indication for operative treatment is:

- a. Associated rotational deformity.
- b. Intermetatarsal angle of 20
- c. Painful deformity.
- d. Hallux valgus angle of 35
- e. Associated curly 2nd toe.

Answer: c

### Hallux valgus “bunion”

- Not a pediatric foot condition, included here because of its importance
- The commonest of the foot deformities (and probably of all musculoskeletal deformities).
- The elements of the deformity are lateral deviation and rotation of the hallux, together with a prominence of the medial side of the head of the first metatarsal (a bunion); there may also be an overlying bursa and thickened soft tissue. Lateral deviation of the hallux may lead to overcrowding of the lateral toes and sometimes over-riding
- Most common in women between 50 and 70 years, bilateral
- Proposed factors include wearing overly tight shoes, family history, and rheumatoid arthritis.
- Diagnosis is generally based on symptoms and supported by X-rays
- A similar condition of the little toe is referred to as a bunionette or Tailor's bunion, is a condition caused as a result of inflammation of the fifth metatarsal bone at the base of the little toe
- The patient is encouraged to wear shoes with deep wide toe-boxes, soft uppers and low heels
- Treatment may include proper shoes, orthotics, or NSAIDs. If this is not effective for improving symptoms, surgery may be done

## Hallux Valgus



Q11. A pointing index sign results from injury to the:

- a. Posterior interosseous nerve
- b. Median nerve
- c. Radial nerve
- d. Ulnar nerve
- e. Musculocutaneous nerve

Answer: b

Flexion of the index finger depends on FDS + FDP which are supplied by **median nerve**.

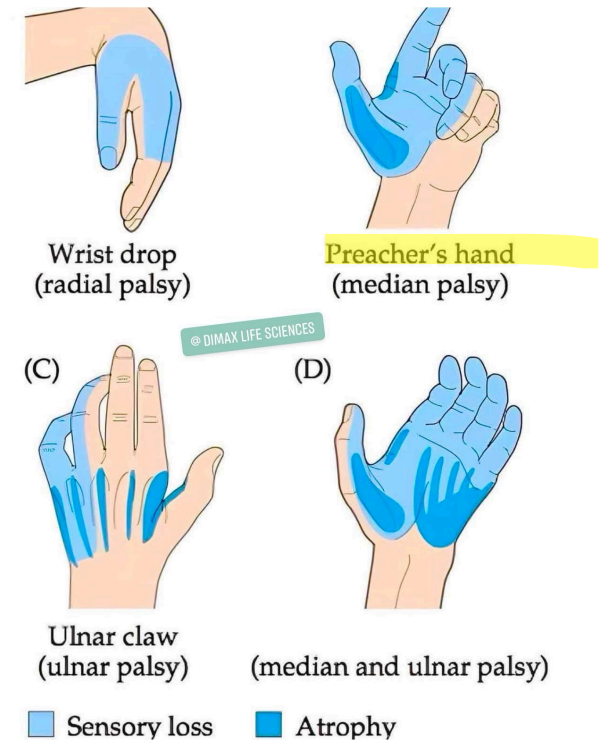
Remember:

Posterior interosseous nerve → wrist/finger extension problem

Radial nerve → wrist drop

Ulnar nerve → claw hand (ring & little finger)

Musculocutaneous nerve → elbow flexion weakness



Q12. 10-year-old male child presented with a painful rigid flat foot deformity; his pain started few months ago. He has no trauma to the foot, no constitutional symptoms. No underlying neurological abnormality. Most probably he has:

- a. Degenerative mid-foot arthropathy
- b. Skew foot
- c. Calcaneo-navicular coalition
- d. Club foot
- e. Peroneal spasticity

Answer: c

### Pes planus (Flat foot):



- The term ‘flat-foot’ applies when the apex of the longitudinal arch has collapsed, and the medial border of the foot is in contact (or nearly in contact) with the ground; the heel becomes valgus and the foot supinates at the forefoot.
- The appearance of flat-foot can be normal and without symptoms (the arch is not formed until 4–6 years of age and about 15% of the population have supple asymptomatic flat-feet) but some conditions are characterized by flat-feet that are stiff and painful.
- Classified into either:

Next slide ←

1. Rigid (Stiff, which cannot be corrected passively should), caused by
  - Congenital vertical talus
  - Coalition of tarsals (calcaneo-navicular, or talo-calcaneal (often a bar of bone connecting the calcaneus to the talus or the navicular)
  - Juvenile chronic arthritis.

2. Flexible (Mobile, most common), asymptomatic but is associated with peroneal spasm.

- Often appears in toddlers as a normal stage in development, and it usually disappears after a few years when medial arch development is complete.
- Ask the patient to stand on his tip toes and look from behind, heel valgus corrects on tip toe and the medial arch reforms. The medial arch also reforms on extending the great toe at the MTP joint.



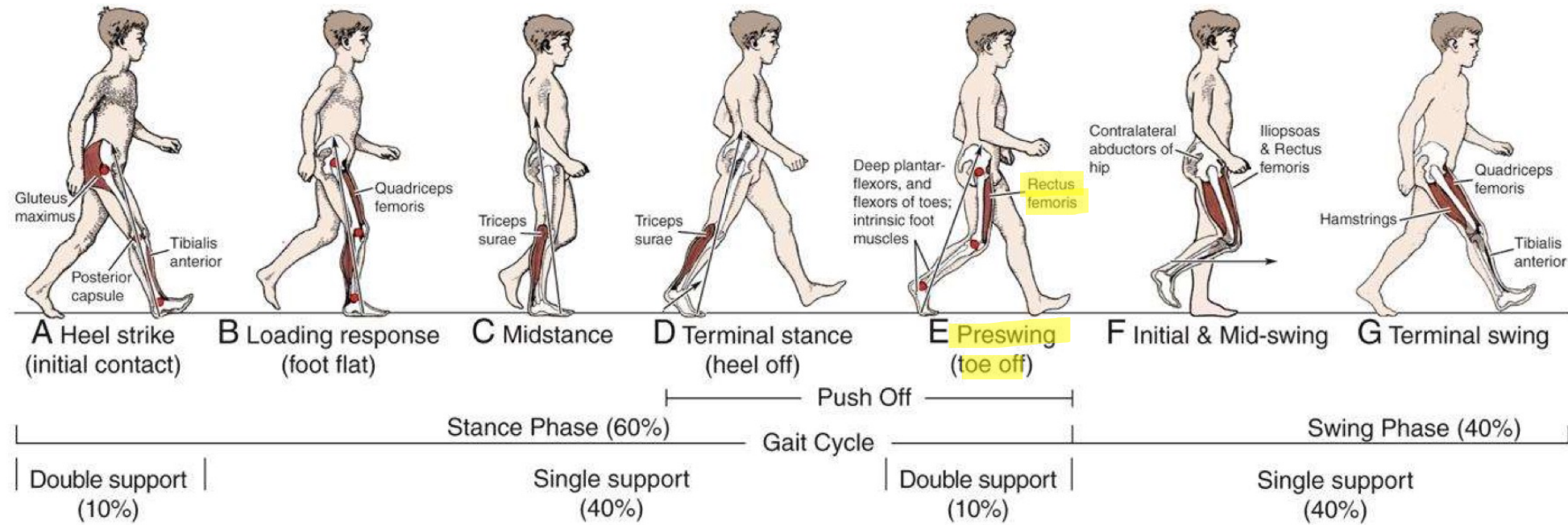
## Tarsal coalition:

- Connection of two or more tarsal bones. This bridge could be bony (synostosis), cartilaginous (synchondrosis) or fibrous (syndesmosis).
- Fibrous then cartilaginous then bone
- Progress with age
- Presentation of pain with the commencement of ossification
- Etiology: Defect in the differentiation of primitive mesenchyme
- Age of onset:
  - Calcaneo-navicular usually 8-12 years old (most common 1/2-2/3 of cases)  
anteater nose sign on x-ray
  - Talocalcaneal usually 12-15 years old. → c sign on x-ray
- Deformity
  - Flattening of longitudinal arch
  - Abduction of forefoot
  - Valgus hindfoot
  - Peroneal spasticity (also known as peroneal spastic flatfoot)
- CT scan necessary to confirm and rule-out other coalitions
- Pain onset correlates with age of ossification of coalition
- Treatment
  - Conservative (soft shoe inserts, walking-cast immobilization)
  - Surgery (arthrodesis, resection of coalition)

Q13. The rectus femoris is active at what phase of the gait cycle:

- a. at pre swing
- b. at late swing
- c. at mid stance
- d. Immediately following initial contact
- e. at terminal stance

Answer : a



Q14. one is not a feature of intertrochanteric fracture:

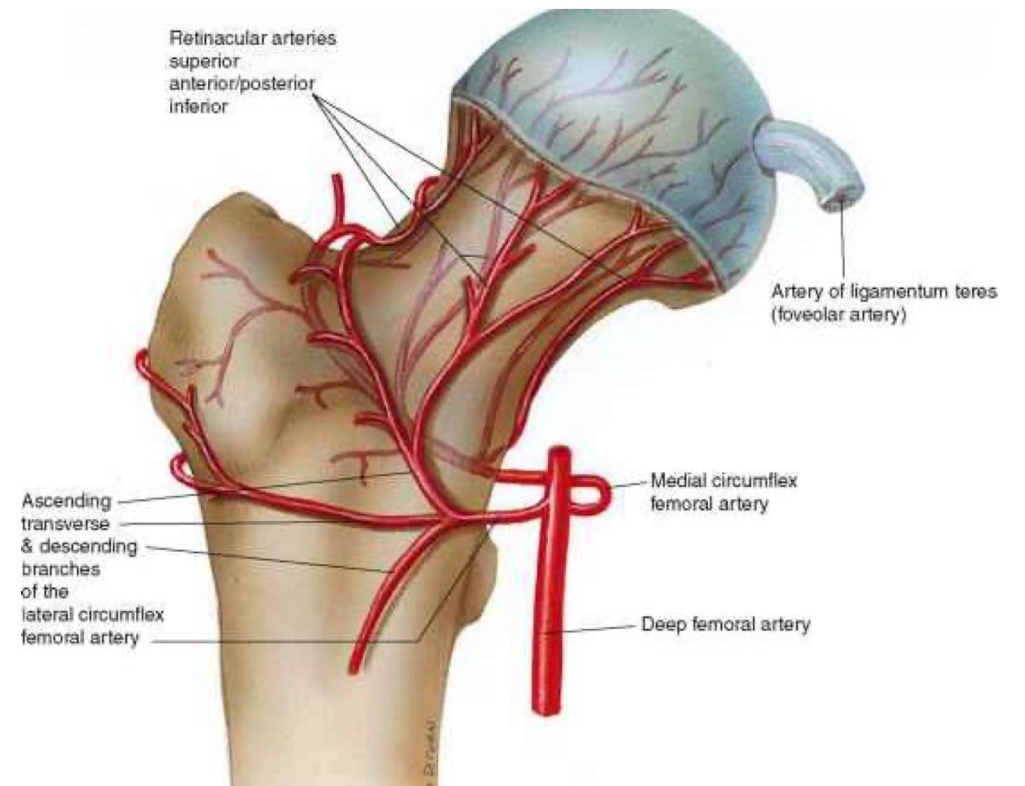
- a. More vascular anastomosis
- b. High risk of femoral head avascular necrosis
- c. Better healing than femur neck fractures
- d. More cancellous type of bone
- e. Less nonunion

Answer: b

The intertrochanteric region has a plenty of blood supply due to an anastomosis between the medial and lateral circumflex femoral arteries., therefore the possibility of healing after a fracture is perfect.

If one of the intertrochanteric vessels is injured, the region can still be supplied by the remaining vessels through collateral circulation. In contrast, fractures of the femoral neck—especially intracapsular fractures—carry a high risk of avascular necrosis due to disruption of the retinacular vessels supplying the femoral head.

Dr. Omar Samara's notes



Q15. A 25-year-old male patient presented with history of mechanical low back pain for 2 months. without radicular symptoms or red flags. on examination the pain becomes worse with flexion and extension although the patient can do full range of motion. the best course of management ?

- a. Oral steroids
- b. Lumbo-sacral spine x-ray
- c. Analgesia, limited bed rest, and return to work as pain allowed
- d. Intra-muscular steroid injection
- e. Lumbar MRI

Answer: c

# Notes:

- Most patients deny previous attacks of low back pain.
- Pain after lifting a heavy object → disc prolapse or muscular pain.
- Buttocks pain is usually referred from the back.
- In sciatica pain is in a dermatomal distribution.
- Age of back pain is between 20 and 45, above or below this is usually abnormal.
- Most common type of back pain is non-specific back pain.
- Education is very important to prevent recurrence.
- Back pain → 60% resolve spontaneously within 6 weeks. 40% become chronic ( > 3 months or Multi recurrent in 3 months )
- 85% of back pain is due Musculoskeletal causes
- History is the most important thing in Dx.
- In Disc prolapse the spine tilt away from the pathology when the nerve compressed from above , and tilt toward the pathology when compressed from below.
  - Sciatic scoliosis and lumbar disc herniation. They found that if the lesion is located laterally in the disc space, then the list occurs to the contralateral side.
  - If the protrusion is lateral to the nerve root, then the patient will lean away from the lesion, whereas if the protrusion is medial to the root the list will be towards the lesion
  - Patients with lumbar disc herniation and sciatica scoliosis tended to list to the side opposite to the sciatica, producing convexity towards the side of the sciatica
- Thrombosis is rare but can cause back pain , it come in ( severe pain , old age , history of vascular diseases and not affected by position as disc pain ).
- A pt with lower back pain , -ve red flags, -ve vascular, -ve neural signs :
  - Reassure the patient , give NSAIDs , give muscle relaxant , local NSAIDs if needed , must be used in high frequency , topical apply and for 2-3 min uncovered to be absorbed.
  - Rest is for 2 days only. after that you encourage the pt to return to his daily activity .
  - Physiotherapy : Cold for analgesia ( early ) , Hot for increase blood supply → increases the level of the drugs reaching the tissue
  - Pt education about the activity he can do and the best positions of sitting and lifting objects .. etc.
- The chronic back pain that come and go unnoticed , usually there is minor traumatic events that cause fissuring in the annulus fibrosus and when the major lifting happened it cause the herniation .
- 80 % there is a trauma ( Normal disc ) that cause the disc to fissure, 20 % of cases the cause is degenerative ( black disc ) and usually pt's have sitting intolerance ( not able to sustain a specific sitting position for long time )
- Some disc prolapses are positional, you need dynamic MRI to detect.
- 93% of patient with disc prolapse only need conservative tx. and 7 % need surgery

Dr. Fadi's handout

Q16. One of the followings is not a risk factor for Quadriceps Tendon Rupture:

- a. steroid use
- b. connective tissue disorders
- c. rheumatoid arthritis
- d. diabetes
- e. hypoparathyroidism

Answer: e

## Quadriceps Tendon Rupture

quadriceps tendon  
rupture is more  
common than patellar  
tendon rupture

> 40 years of age

males > females

nondominant limb >  
dominant

usually at insertion of  
tendon to the patella

Think weakened collagen,  
impaired healing,  
or abnormal  $\text{Ca}^{2+}/\text{PO}_4^{3-}$   
metabolism.

## risk factors

renal failure

diabetes

RA

hyperparathyroidism

CTD

steroid use

intraarticular injections

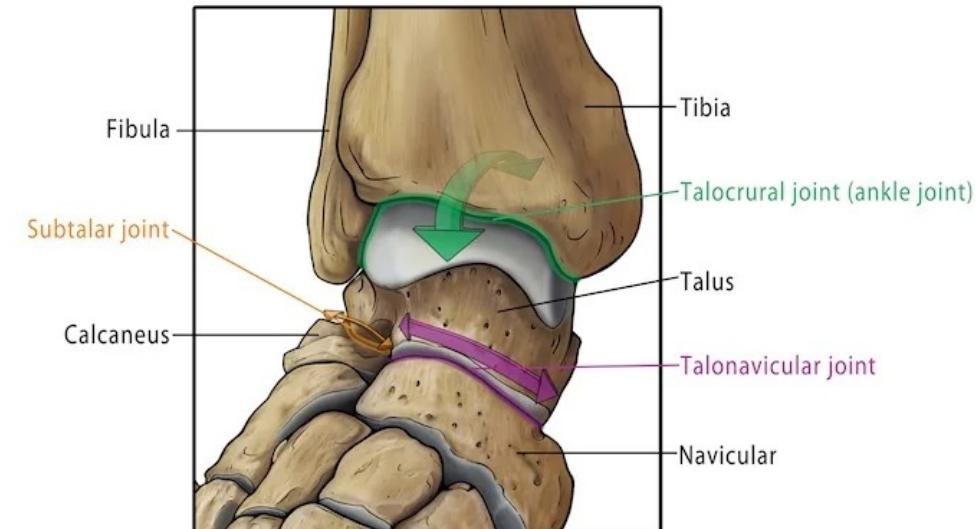
Q17. One of is not seen during examination of typical clubfoot deformity:

- a. Equines deformity
- b. Deep medial foot crease
- c. More forefoot supination in relation to the hindfoot
- d. Forefoot adduction
- e. Hind foot varus

Answer:b

Clubfoot, the deformaty occurs across 4- joints:

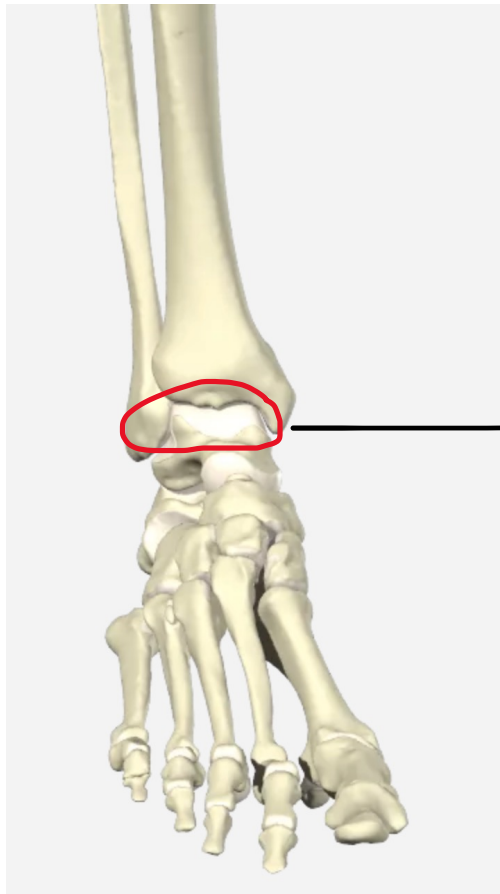
1. Ankle
2. Subtalar
3. Talonavicular joint
4. Calcaneocuboid joint



Anterior view

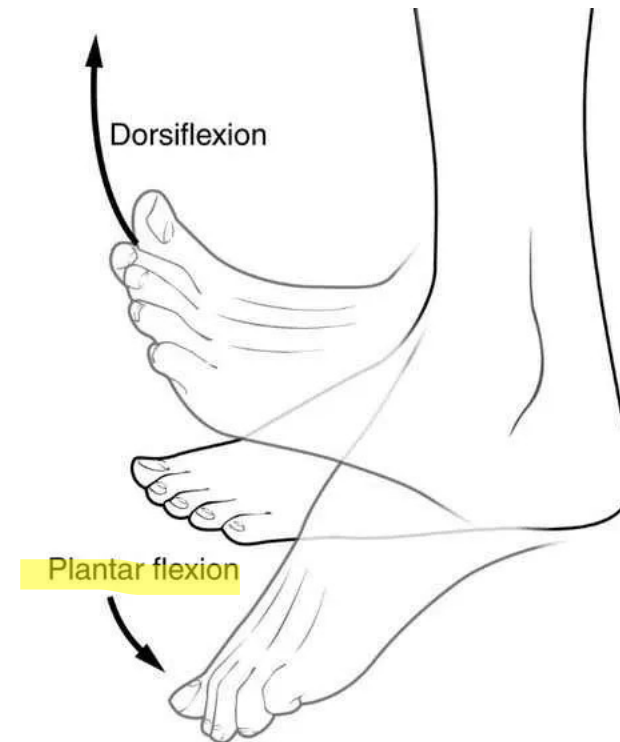
Next few slides,.....

# Ankle joint → planter flexion

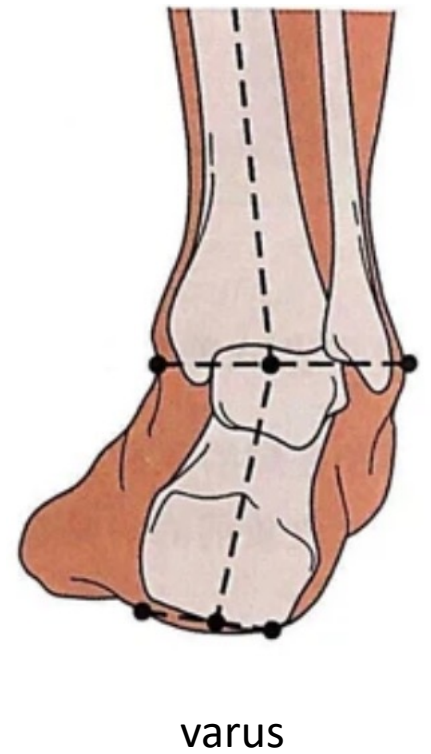
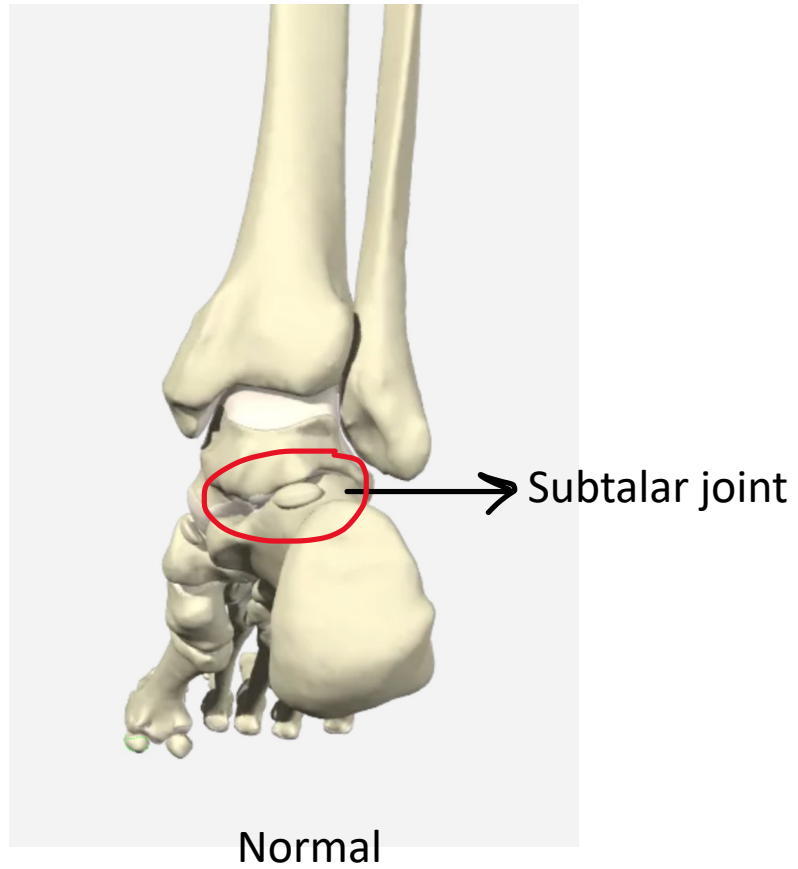


→ Ankle joint

normal

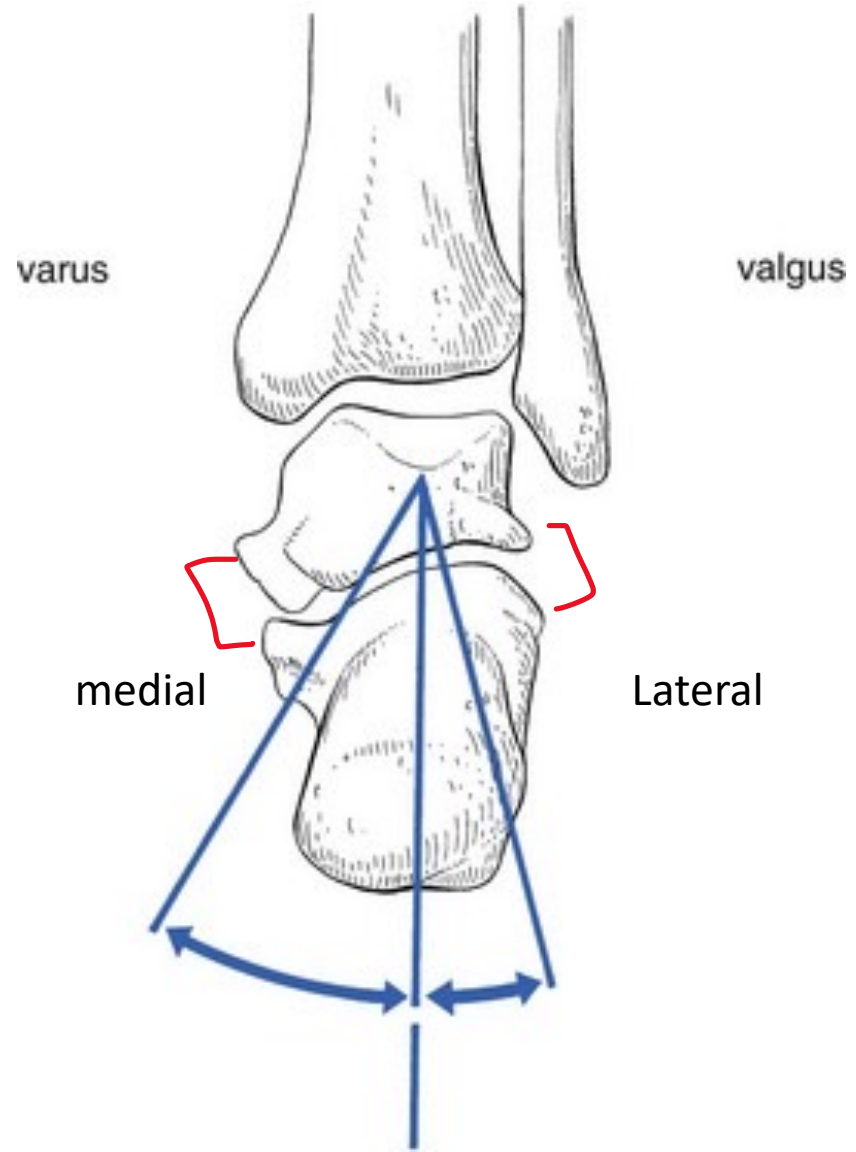


# Subtalar joint → Varus

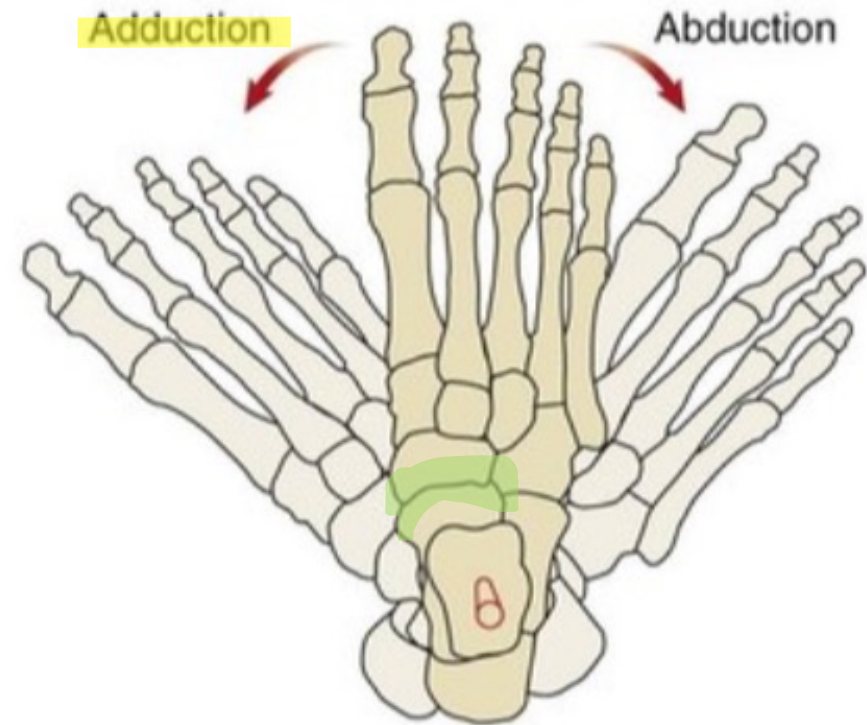
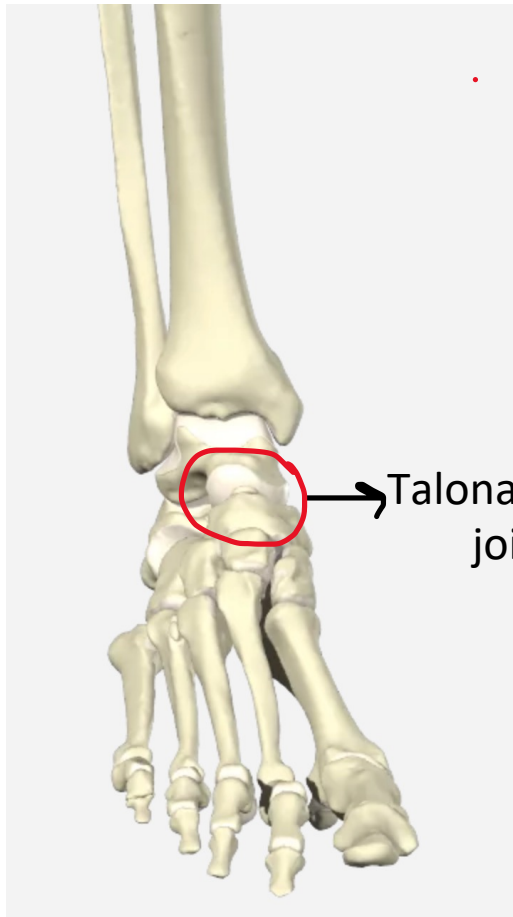


# Subtalar joint

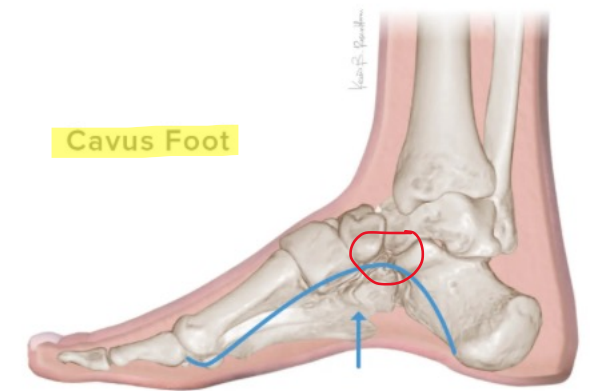
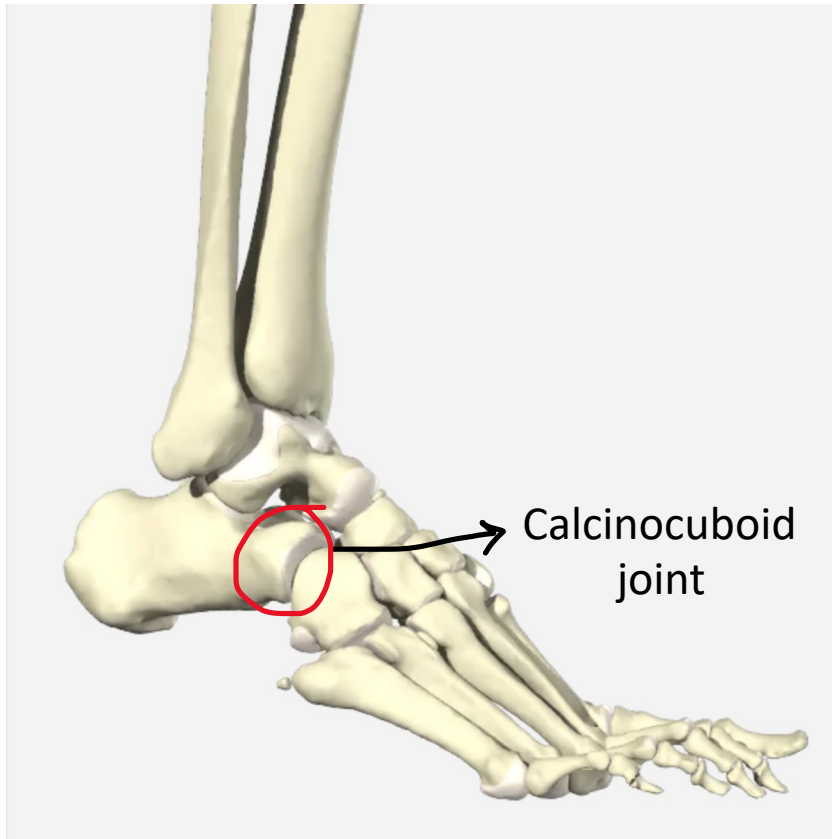
Varus / valgus



# Talonavicular joint → adduction



# Calcinocuboid → Cavus ( high arch)



# All together = Clubfoot

## CAVE

Cavus

Adductus

Varus

Equinus

The equinus deformity (ankle plantarflexion) causes the entire foot to point downward, which masks or prevents formation of a deep medial crease in a typical newborn clubfoot.



Q18. A 48-year-old male had a direct trauma to his left lower limb resulting in isolated posterior knee dislocation, he had decreased sensation over the foot and absent distal pulses. Next step is:

- a. More Intravenous fluids.
- b. Application of external fixator.
- c. Urgent Arthroscopy.
- d. Reduction.
- e. Angiogram in the Emergency room.

Answer: d

Posterior ankle dislocation with absent pulses → popliteal artery injury.

Reduction can restore arterial flow, relieve intimal kinking, and sometimes brings the pulse back instantly.

Q19. The structure that determine the stability in ankle fracture is:

- a. syndesmosis
- b. articular surface
- c. Anterior talofibular ligament
- d. calcaneofibular ligament
- e. Posterior talofibular ligament

Answer: a

### Type A

- **Below** level of the ankle joint
- Tibiofibular **syndesmosis intact**
- Deltoid ligament intact
- Medial malleolus often fractured
- Usually stable



### Type B

- **At the level** of the ankle joint
- Syndesmosis intact or partially torn
- No widening of distal tibiofibular articulation
- Medial malleolus may be fractured
- Deltoid ligament may be torn
- Variable stability



### Type C

- **Above** the level of the ankle joint
- **Syndesmosis disrupted**
- Widening of distal tibiofibular articulation
- Medial malleolus fracture
- Deltoid ligament injury
- Unstable (requires ORIF)



## Classification and treatment

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- Danis-Weber

Q20. Denosumab Mechanism of action in the treatment of osteoporosis is:

- a. Activates Wnt pathway by binding sclerostin
- b. Agonist on estrogen receptors in bone
- c. Stimulates intestinal absorption Ca and PO<sub>4</sub>
- d. Binds membrane receptors on osteoclasts to inhibit resorption
- e. Monoclonal Ig2 against RANKL

Answer: e

Important medications used in osteoporosis treatment:

1. **Raloxifene.** → estrogen receptor agonist
2. **Vitamin D** → ↑  $\text{Ca}^{+2}/\text{PO}_4^{3-}$  absorption
3. **Bisphosphonates** → induce osteoclast apoptosis
4. **Denosumab** → Monoclonal Ig2 against RANKL

Q21. One of the following x-ray changes is pathognomonic for chronic osteomyelitis:

- a. Involucrum
- b. Rarefaction
- c. Bone destruction
- d. Sequestrum
- e. Sinus

Answer : d

## Chronic Osteomyelitis (>3wks)

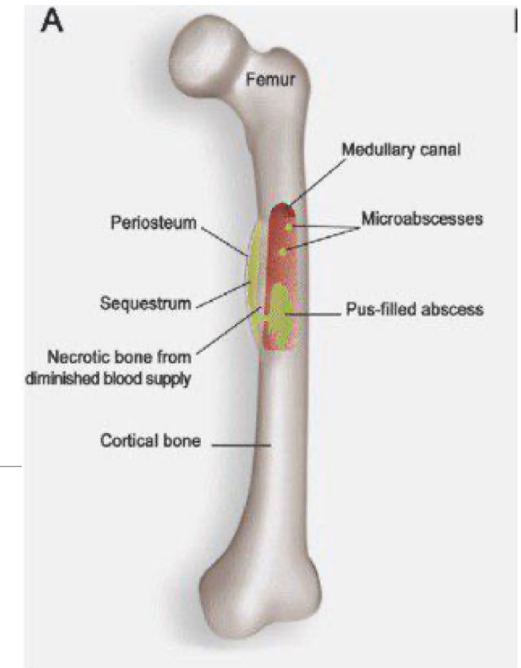
- Follows acute infection
- Chronic from the start

**M.C. Organism: Staph. Aureus**

Next slide ← **Sequestra are usually present (pathognomonic of chronic osteomyelitis)**

Caused by:

- Acute osteomyelitis
- Open fracture
- Operation



# Acute osteomyelitis :

## Pathophysiology: Hematogenous Progression of Disease

---

Infection (regardless site) leading to inflammation and exudation

increase intra-osseous pressure and decrease in perfusion pressure

decrease in blood supply leading to ischemia

thrombosis from pus formation that digests the vessels wall in addition to stasis from its accumulation

Elevation of periosteum also will lead to decreased blood supply

---

✓ *all these changes lead to decrease in blood supply leading to :-*

-ischemia and necrosis > **sequestrum** ( dead bone ) hyper dense collapsed trabeculae

New bone formation (the body reacts to the elevation of periosteum as if its a fracture )

-The new bone formed is called **involucrum** ,(perioseal reaction)

- The increased blood flow will lead to hypo dense areas called rarefaction .

Q22. One of the following is NOT an indication of MRI in patients with acute low back pain:

- a. Night pain, rest pain
- b. Post-menopausal osteopenia
- c. History of malignancy
- d. Progressive neurological deficit
- e. New onset urinary incontinence

Answer: b

Night pain, rest pain → suspicion of malignancy/ infection. (Answer A)

Hx of malignancy → red flag. (Answer C)

Progressive neurological deficit → cord compression. (Answer D)

New onset urinary incontinence → suspicion of cauda equina. (Answer E)

In all of these scenarios MRI is mandatory to rule out/in these conditions. However, for postmenopausal woman, **DEXA scan** may be used to confirm the diagnosis of osteoporosis/ osteopenia.

2020

Q1. The major determinant of the type of healing of a fracture (primary or secondary healing) is:

- a. The age of the patient
- b. The extent of soft tissue injury
- c. The site of the fracture
- d. The degree of fracture displacement
- e. The stability of fracture fixation

Answer: e

## Types of Fracture Healing

- Secondary bone healing is seen with fractures held by a method resulting in **relative stability** (e.g. cast, sling, k-wires, intramedullary nails, etc.).
- Primary bone healing is only possible with:
  1. Fracture gap of less than 2 mm
  2. Motion at the fracture site of less than 1 mm or possibly only a few micrometers (**absolute stability**).

Q2. Which one of the following pairs best matches:

- a. Distal radius fracture: anterior interosseous nerve injury
- b. Midshaft humeral fracture: median nerve Injury
- c. Salter Harris I fracture: significant growth arrest
- d. Posterior hip dislocation: sciatic nerve injury
- e. Ankle fracture-dislocation: Popliteal artery injury

Answer: d

- The sciatic nerve lies right behind the hip joint and is **the Most commonly injured** nerve in posterior hip dislocations. [Next slide](#)

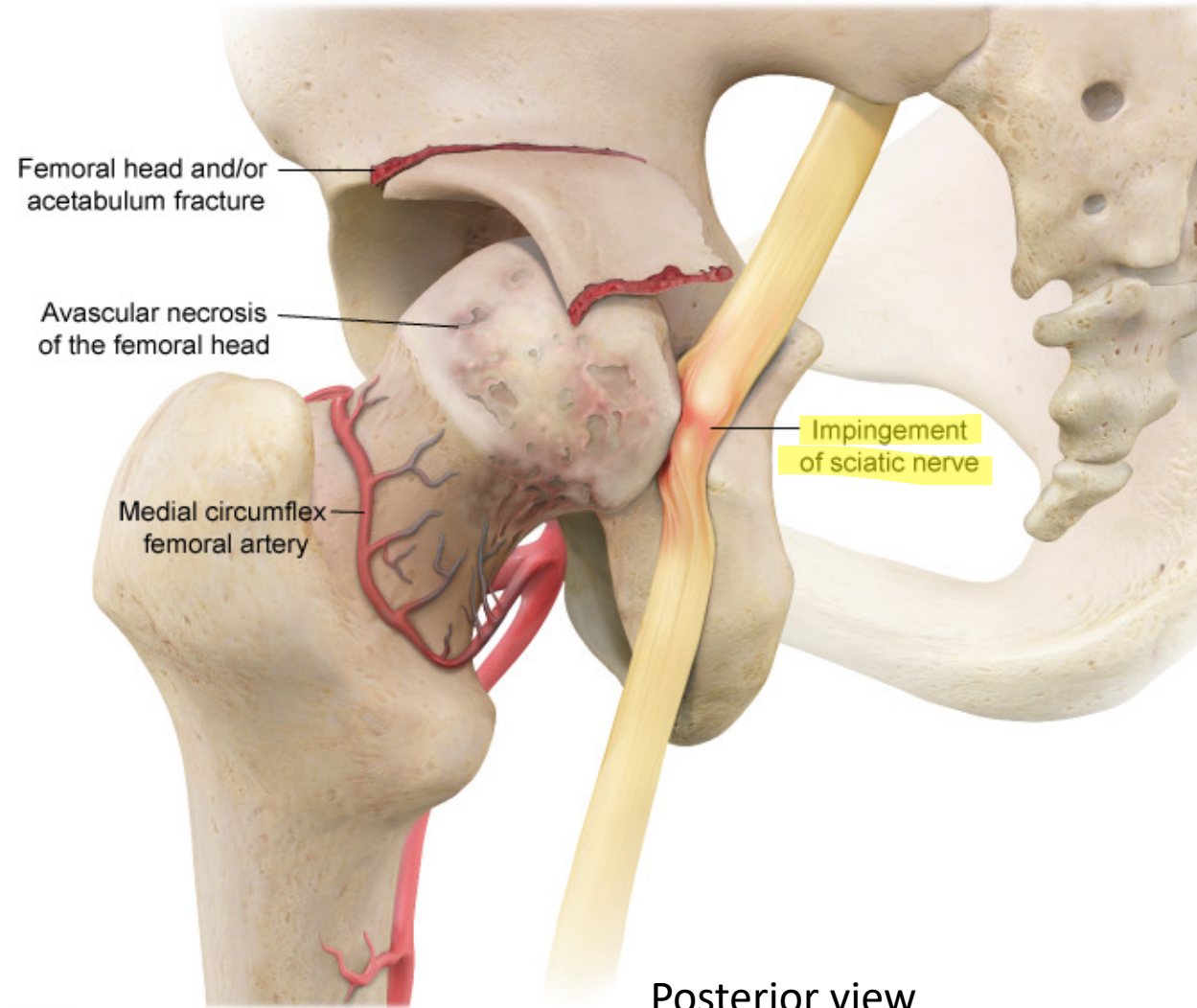
Distal radius fracture → median nerve compression (colle's fracture) ([Answer A](#)).

Humeral shaft fracture → radial nerve injury ([Answer B](#)).

Salter Harris type I → excellent prognosis with minimal risk of growth disturbance ([Answer C](#)).

Popliteal artery dislocation → knee dislocation ([answer E](#)). Ankle dislocation may cause injury to dorsalis pedis vessels.

## Complications of posterior hip dislocation



Q3. Which of the following x-ray findings is characteristic of a left sided developmental dysplasia of the hip (dislocation type) in a 7 months old female infant:

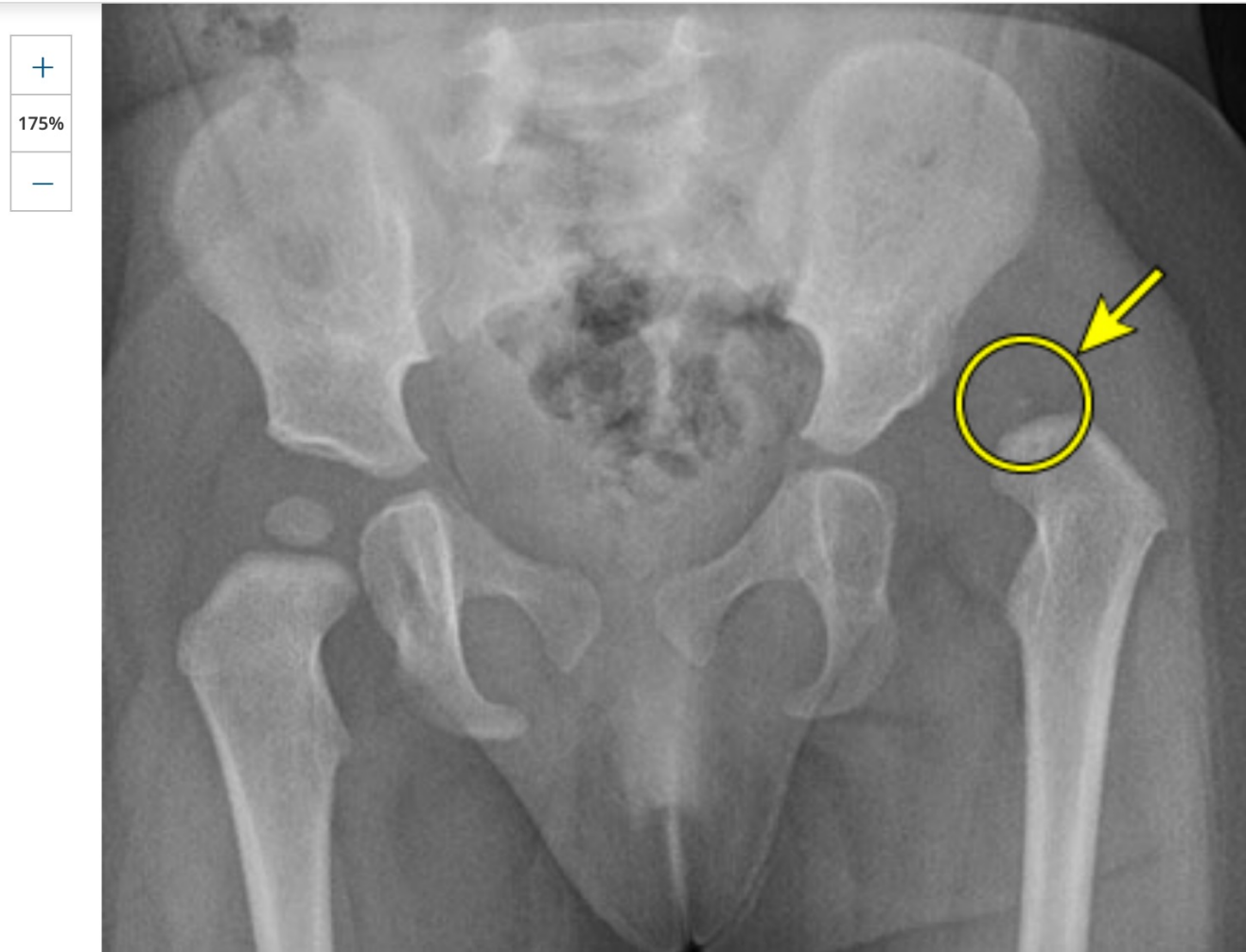
- a. Acetabular index more than 30 degrees with the ossific nucleus located in the upper outer quadrant
- b. Acetabular index less than 30 degrees with the ossific nucleus located in the lower outer quadrant
- c. Acetabular index more than 30 degrees with the ossific nucleus located in the lower outer quadrant
- d. Acetabular index less than 30 degrees with the ossific nucleus located in the upper outer quadrant
- e. Absent ossific nucleus of the femur head

Answer: a

Radiographic findings consistent with DDH include:

1. **Lateral** and **superior** positioning of the ossified portion of the femoral head and neck. [Next slide](#)
2. Increased acetabular index, normal values for the acetabular index are as follows:  $<35^\circ$  at birth,  $<25^\circ$  at 1 year,  $<20^\circ$  at 2 to 3 years,.
3. No ossification of the femoral nucleus by six months of age on the involved side, or asymmetric sizes of the femoral ossific nuclei. **UpToDate**

### Delayed ossification of femoral nucleus



This frontal view of the pelvis demonstrates complete superolateral dislocation of the left femoral head. Note the lack of ossification of the left femoral nucleus (arrow). The right hip is normal.

Q4. Which of the following features is found in a severe slipped capital femoral epiphysis in an adolescent male patient?

- a. Weak ankle dorsiflexion
- b. Absent dorsalis pedis pulse
- c. There is always a history of trauma
- d. Normal AP and lateral x-ray of the pelvis
- e. Obligatory external rotation on hip flexion

Answer: e

Physical exam findings in SCFE:

1. Abnormal gait (antalgic), waddling gait in bilateral cases, and decreased ROM (flexion and internal rotation).
2. Obligatory external rotation, i.e., ER of the hip as the hip is brought into flexion.
3. walking with the externally rotated foot.

Q5. A 65-year-old carpenter presented with progressive bilateral knee pain that is not interfering with his activities of daily living, he has medial joint line tenderness and decreased joint space on x-ray, you will advise him:

- a. To decrease his weight and take paracetamol
- b. To take hyaluronic acid supplements
- c. To do bilateral knee arthroscopy
- d. To go for total knee replacement
- e. To have stem cells transplantation

Answer: a

Q6. In acute osteomyelitis, the pain is caused by:

- a. Increased intraosseous pressure
- b. Abscess formation
- c. Periosteal reaction
- d. Avascular necrosis
- e. Fracture

Answer: a

Infection triggers inflammation inside the rigid medullary cavity. Pus and edema accumulate, but bone can't expand. The result is **rising intraosseous pressure**, which compresses venous outflow, irritates nociceptors, and produces deep, throbbing pain. ChatGPT

Q6. Regarding Osteomalacia one is correct:

- a. Appendicular fracture predominance
- b. Alkaline phosphatase levels always normal
- c. Defined as reduced bone mass with normal mineralization
- d. Tetracycline labeling normal
- e. Post-menopausal only

Answer:a









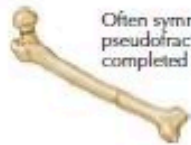
Appendicular fracture is a fracture of the limbs.

Osteomalacia is a metabolic bone disease, where defective mineralization results in a large amount of unmineralized osteoid with normal bone mass density ([Answer C](#)).

High ALP reflects increased osteoblastic activity. In osteomalacia, defective mineralization stimulates increased osteoid production, leading to elevated ALP levels ([Answer B](#)).

In contrast to osteoporosis, post menopause age is not a risk factor for developing osteomalacia ([Answer E](#))

Tetracycline labeling is the process by which tetracycline binds to calcium and becomes incorporated into actively mineralizing calcified tissues. This process requires normal mineralization. Since mineralization is impaired in osteomalacia, tetracycline bone labeling is markedly reduced or absent ([Answer D](#))

		<b>Osteoporosis</b>	<b>Osteomalacia</b>
<b>Definition</b>	 <p>Normal</p>	 <p>Bone mass decreased, mineralization normal</p>	 <p>Bone mass variable, mineralization decreased</p>
<b>Age at onset</b>		 <p>Generally elderly, postmenopause</p>	 <p>Any age</p>
<b>Etiology</b>		Endocrine abnormality, age, idiopathic, inactivity, disuse, alcoholism, calcium deficiency	Vitamin D deficiency, abnormality of vitamin D pathway, hypophosphatemic syndromes, renal tubular acidosis, hypophosphatasia
<b>Symptomatology</b>		 <p>Pain referable to fracture site</p>	 <p>Generalized bone pain</p>
<b>Signs</b>		Tenderness at fracture site	Tenderness at fracture site and generalized tenderness
<b>Radiographic features</b>		 <p>Axial predominance</p>	 <p>Often symmetric, pseudofractures, or completed fractures</p> <p>Appendicular predominance</p>
<b>Laboratory findings</b>	Serum Ca <sup>++</sup> Serum P <sub>i</sub> Alkaline phosphatase Urinary Ca <sup>++</sup> Bone biopsy	Normal Normal Ca <sup>++</sup> x P <sub>i</sub> >30 Normal High or normal Tetracycline labels normal	Low or normal (high in hypophosphatasia) Low or normal Ca <sup>++</sup> x P <sub>i</sub> >30 if albumin normal (high in renal osteodystrophy) Elevated, except in hypophosphatasia Normal or low (high in hypophosphatasia) Tetracycline labels abnormal

Q7. A 15-year old female patient is being assessed for scoliosis that was noticed 2 years ago, her curve measure 65 degrees.

How would you counsel her with regards to this deformity?

- a. Neurological exam is not mandatory in idiopathic scoliosis
- b. Pain is rare with this type of deformity
- c. She doesn't need treatment as it is unlikely that this curve will progress
- d. A type 5 riser sign indicates that this patient is skeletally mature
- e. The main goal of surgery if to be done is cosmetic

Answer: d

**Risser's sign** is an indirect measure of skeletal maturity, on a scale of 5, where the grade of 5 means that skeletal maturity is reached. (next slide)

History and physical exam are mandatory to exclude congenital & neuromuscular types ( answer A).

A 65° indicates severe scoliosis that is associated with future cosmetic, functional and possibly cardiopulmonary issues that needs surgery, the main goal of surgery is to prevent progression. (answer C &E).

While pain is not typically associated with adolescent idiopathic scoliosis, the patient has not been confirmed to have the idiopathic type; therefore, other causes such as neuromuscular/ congenital scoliosis remain possible. Making answer D the ideal choice.

### SKELETAL MATURITY – RISSER’S SIGN

- Indirect measure of skeletal maturity, whereby the ossification stage of iliac apophysis is used to judge the ossification of spinal vertebra. On a scale of 5, it gives a measure of progression of ossification; **the grade of 5 means that skeletal maturity is reached.**
  - The curve of scoliosis often progresses most during the period of rapid skeletal growth and maturation.
  - The iliac apophysis start ossifying shortly after puberty.
  - Ossification extends medially and, once the iliac crests are completely ossified, further progression of the scoliosis is minimal (Riser’s sign).
  - This stage of development usually coincides with fusion of the vertebral ring apophysis. ‘Skeletal age’ may also be estimated from x-rays of the wrist and hand.
1. Grade 1 → when the ilium (bone) is calcified at a level of 25%; it corresponds to prepuberty or early puberty.
  2. Grade 2 → when the ilium (bone) is calcified at a level of 50%; it corresponds to the stage before or during growth spurt.
  3. Grade 3 → when the ilium (bone) is calcified at a level of 75%; it corresponds to the slowing of growth.
  4. 4. Grade 4 → when the ilium (bone) is calcified at a level of 100%; it corresponds to an almost cessation of growth.
  5. **5. Grade 5 → when the ilium (bone) is calcified at a level of 100 % and the iliac apophysis is fused to iliac crest; it corresponds to the end of growth.**



Q8. 12-year old boy had a knee x-ray after injuring his knee while playing basketball. It showed a lesion in the distal femoral metaphysis. The presence of which of these radiological findings favors a malignant entity over a benign one:

- a. Cortical preservation
- b. Narrow transition zone
- c. Sclerotic rim
- d. Well-defined margin
- e. Codman's triangle

Answer: e

## General Features

Of malignant bone tumors

- Rapid growth, warmth, and tenderness.
- Have periosteal reaction on x-rays:
  - Codman's triangle (periosteal elevation).
  - Sunburst pattern/Sunrays appearance.
  - Onion skin appearance (Ewing's sarcoma).



Q9. Which of the following statements describe the deformity best known as rocker bottom foot in a child?

- a. Treatment is always surgical
- b. It is basically a dislocated talocalcaneal joint
- c. Its flexible
- d. It is rarely bilateral
- e. It carries a worse prognosis when compared to a clubfoot

Answer: e

### **Congenital vertical talus (Rocker-bottom foot):**

- Irreducible dorsal dislocation of the **navicular on the talus** producing a rigid flatfoot deformity:
  - Irreducible dorsolateral navicular dislocation
  - Vertically oriented talus
  - Calcaneal eversion with attenuated spring ligament
- Soft tissue contractures:
  - Displacement of peroneal longus and posterior tibialis tendon so they function as dorsiflexors rather than plantar flexors
  - contracture of the Achilles tendon
- **Worse prognosis than club foot.**
- High incidence with various **congenital anomalies** and neuromuscular diseases; such as:
  - ✓ Myelomeningocele
  - ✓ DDH
  - ✓ Arthrogryposis
  - ✓ Trisomy 13
  - ✓ Marfan syndrome

↳ it's often bilateral
- **Presentation: (Rigid rocker-bottom deformity)**
  - **Fixed hindfoot equinovalgus: due to contracture of the Achilles and peroneal tendons**
  - **Rigid midfoot dorsiflexion: secondary to the dislocated navicular**
  - **Forefoot abducted and dorsiflexed: due to contractures of the EDL, EHL and tibialis anterior tendons**
- Treatment by **serial casting** (reverse ponseti) and a small surgical procedure is needed before applying the last cast



Q10. A 20-year old male patient with a closed fracture in his right proximal tibia presented with severe pain and swelling in his calf, the earliest sign suggestive of compartment syndrome is:

- a. Pain upon passive stretching of the involved compartment muscles
- b. Absent distal pulses
- c. Excessive swelling of the calf muscle
- d. Change in the skin color
- e. Paralysis of his foot

Answer: a

- **Compartment syndrome**

- Increased pressure within one of the body's compartments results in insufficient blood supply to tissue. There are two main types acute and chronic. The leg or arm are most commonly involved.
- Symptoms of acute compartment syndrome may include severe pain “out of proportion to the injury”, decreased ability to move, numbness, typical posture to reduce the tension in the involved compartment
- Signs include tense swelling and **severe pain upon passive stretching of the involved compartment**
- Pulselessness, Poikilothermia (perishing cold), and pallor are very late signs
  - 2 compartments in arm
  - 3 compartments in forearm
  - 10 compartments in hand
  - 9 compartments in foot
  - 3 compartments in thigh

Q11. The earliest motion to be lost in adhesive capsulitis is:

- a. Abduction
- b. Extension
- c. Adduction
- d. External rotation (in an idiopathic pathology)
- e. All movements are lost to the same degree

Answer: d

## Frozen shoulder (adhesive capsulitis)

- It is a disorder in which the shoulder capsule **becomes inflamed, stiff and grows together with abnormal bands of tissue, called adhesions.**
- Frozen shoulder is characterized by pain and **loss of motion or stiffness in the shoulder.**
- Pain is usually constant, worse at night, when the weather is colder.
- It affects more women than men. The recovery is very slow.
- **First movement to be lost is external rotation**
- It is idiopathic pathology

Q12. -In a 20-year-old male patient who had a shoulder dislocation, what is the most common complication?

- a. Greater tuberosity fracture
- b. Rotator cuff tear
- c. Bankart lesion
- d. Axillary nerve injury
- e. chondrolysis

Answer: c

## Complications

### Early

- Old-> rotator cuff tear
- Middle ages ->Fractures: Greater tuberosity fracture in the anterior dislocation. GT or LT in the posterior dislocation

- Young->BankArt lesion

- Neurovascular lesion

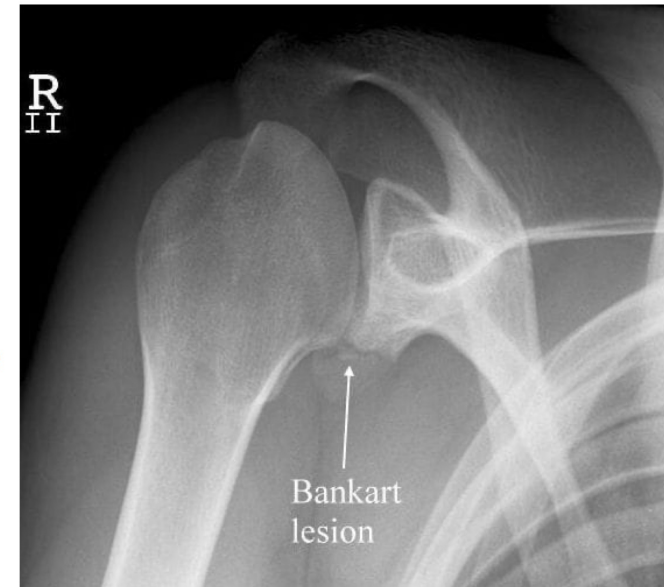
- Hill Sachs lesion in anterior dislocation
- Reverse Hill Sachs in posterior dislocation

## Bankart lesion

### Avulsion of labrum

anterior and inferior glenohumeral ligaments are incompetent.

100% risk for recurrence



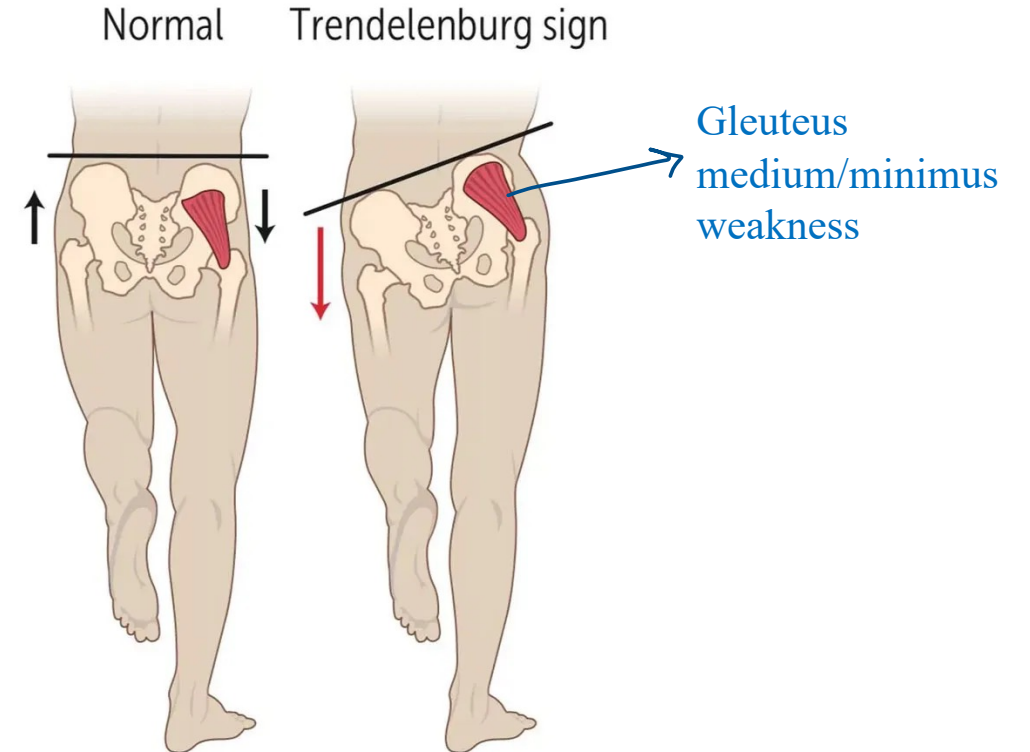
Q13. -During a gait training session, you observed the midstance phase of gait from the anterior (front) view of the left lower extremity. The pelvis has an exaggerated downward tilt on the right side, and the right lower extremity is in swing phase.

What muscle would the you assess for adequate strength?

- a. Left hip adductors
- b. Left hip abductors
- c. Right hip abductors
- d. Right hip adductors
- e. Left hip extensors

Answer: b

Normally, the pelvis remains at the same level when a patient stands on one leg. **Weak hip abductors** cause the pelvis to tilt downward toward the unaffected side when standing on the affected lower extremity (**Trendelenburg gait**). Weakness may be intrinsic to the muscle or related to nerve injury.



Q14. A 30-year female patient presented with 1 week history of mechanical low back pain. without radicular symptoms or red flags. On examination the pain becomes worse with flexion and extension although the patient can do full range of motion.

The best course of management is:

- a. Oral steroids
- b. Analgesia, limited bed rest, and return to work as pain permits
- c. Lumbar spine MRI
- d. Facet joint injection
- e. Lumbo-sacral spine x-ray

Answer: b

# Notes:

- Most patients deny previous attacks of low back pain.
- Pain after lifting a heavy object → disc prolapse or muscular pain.
- Buttocks pain is usually referred from the back.
- In sciatica pain is in a dermatomal distribution.
- Age of back pain is between 20 and 45, above or below this is usually abnormal.
- Most common type of back pain is non-specific back pain.
- Education is very important to prevent recurrence.
- Back pain → 60% resolve spontaneously within 6 weeks. 40% become chronic ( > 3 months or Multi recurrent in 3 months )
- 85% of back pain is due Musculoskeletal causes
- History is the most important thing in Dx.
- In Disc prolapse the spine tilt away from the pathology when the nerve compressed from above , and tilt toward the pathology when compressed from below.
  - Sciatic scoliosis and lumbar disc herniation. They found that if the lesion is located laterally in the disc space, then the list occurs to the contralateral side.
  - If the protrusion is lateral to the nerve root, then the patient will lean away from the lesion, whereas if the protrusion is medial to the root the list will be towards the lesion
  - Patients with lumbar disc herniation and sciatica scoliosis tended to list to the side opposite to the sciatica, producing convexity towards the side of the sciatica
- Thrombosis is rare but can cause back pain , it come in ( severe pain , old age , history of vascular diseases and not affected by position as disc pain ).
- A pt with lower back pain , -ve red flags, -ve vascular, -ve neural signs :
  - Reassure the patient , give NSAIDs , give muscle relaxant , local NSAIDs if needed , must be used in high frequency , topical apply and for 2-3 min uncovered to be absorbed.
  - Rest is for 2 days only. after that you encourage the pt to return to his daily activity .
  - Physiotherapy : Cold for analgesia ( early ) , Hot for increase blood supply → increases the level of the drugs reaching the tissue
  - Pt education about the activity he can do and the best positions of sitting and lifting objects .. etc.
- The chronic back pain that come and go unnoticed , usually there is minor traumatic events that cause fissuring in the annulus fibrosus and when the major lifting happened it cause the herniation .
- 80 % there is a trauma ( Normal disc } that cause the disc to fissure, 20 % of cases the cause is degenerative ( black disc ) and usually pt's have sitting intolerance ( not able to sustain a specific sitting position for long time )
- Some disc prolapses are positional, you need dynamic MRI to detect.
- 93% of patient with disc prolapse only need conservative tx. and 7 % need surgery

Dr. Fadi's handout

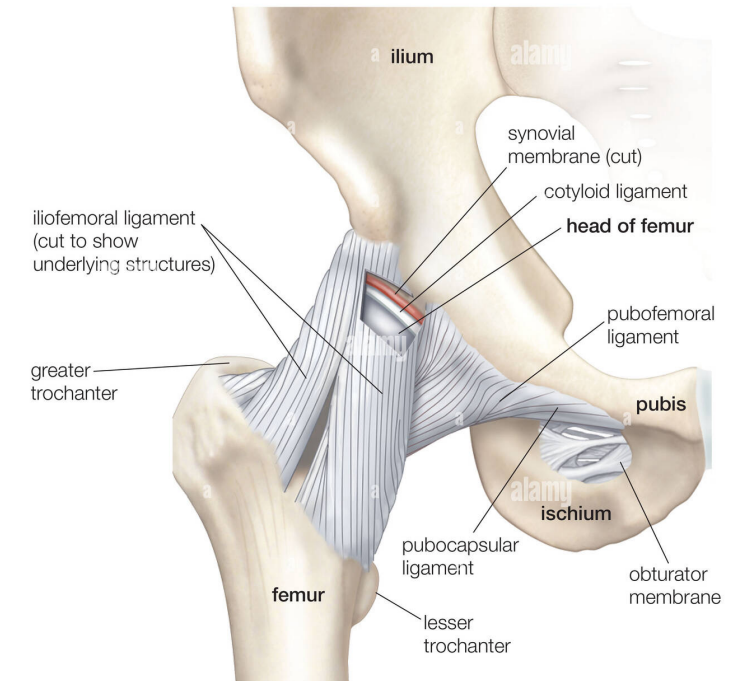
<https://doctor2021.jumedicine.com/wp-content/uploads/sites/13/2025/07/Low-Back-Pain.pdf>

Q15. ONE is in favor of intertrochanteric fractures when compared to femur neck fractures in adults:

- a. Intracapsular in position
- b. Presence of high cortical to cancellous bone
- c. Low risk of nonunion
- d. Impaired hematoma formation
- e. Poor vascular supply

Answer:c

- Intertrochanteric fractures have lower risk of nonunion when compared to femur neck fractures. However, it's important to know that **there is still a risk for non-union** in intertrochanteric fractures.
- Features of Intertrochanteric fractures :
  1. Extracapsular ([Answer A](#))
  2. Occur in cancellous, well-vascularized bone ([Answer B](#))
  3. Have robust hematoma formation ([Answer D](#))
  4. Heal well ([Answer E](#))



Q16. One of the following fracture patterns is more associated than the others with the development of compartment syndrome:

- a. Oblique
- b. Segmental
- c. Avulsion
- d. Transverse
- e. Spiral

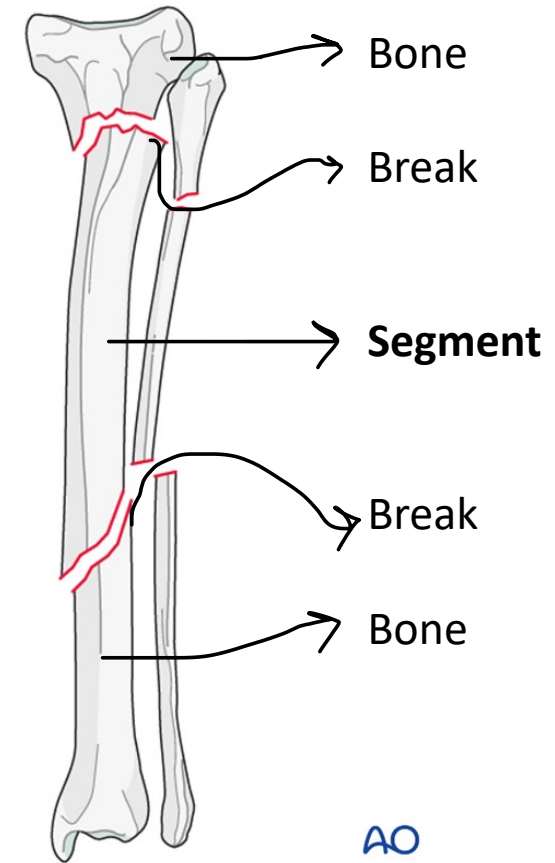
Answer : b

The tibia is involved most often, with acute compartment syndrome. . . . ., Children with tibial fractures/ older age, **ipsilateral fibular fracture**, and **comminuted/segmental fractures** (next slide) were more often associated with **compartment syndrome**.

UpToDate

Remember that **segmental fracture** is a specific type of comminuted fractures with a separate, intact “**floating**” bone segment.

## Segmental fracture



Q17. The most common mechanism that will cause **hand infection** is:

- a. Lymphatic spread from the forearm and arm
- b. Hematogenous spread
- c. Direct spread
- d. Direct inoculation
- e. Infected thrombi

Answer: d

Bacteria are **introduced straight into the tissue** through; Puncture wounds (thorns, needles, splinters), Lacerations, Bites,.....

Q18. Which one of the following is **true** with regards to peripheral nerve injuries?

- a. Median nerve injury: wrist drop
- b. Radial nerve injury: absent ok sign
- c. Femoral nerve injury: foot drop
- d. Sciatic nerve injury: weak adductors
- e. Ulnar nerve injury: positive froment's sign

Answer: e

Froment's = ulnar.

OK sign = median.

Wrist drop = radial.

Foot drop = peroneal.

Hip adduction = Obturator.

Q19. Which of the following physical exam maneuvers would be MOST expected for a patient with a Segond's fracture on his radiograph?

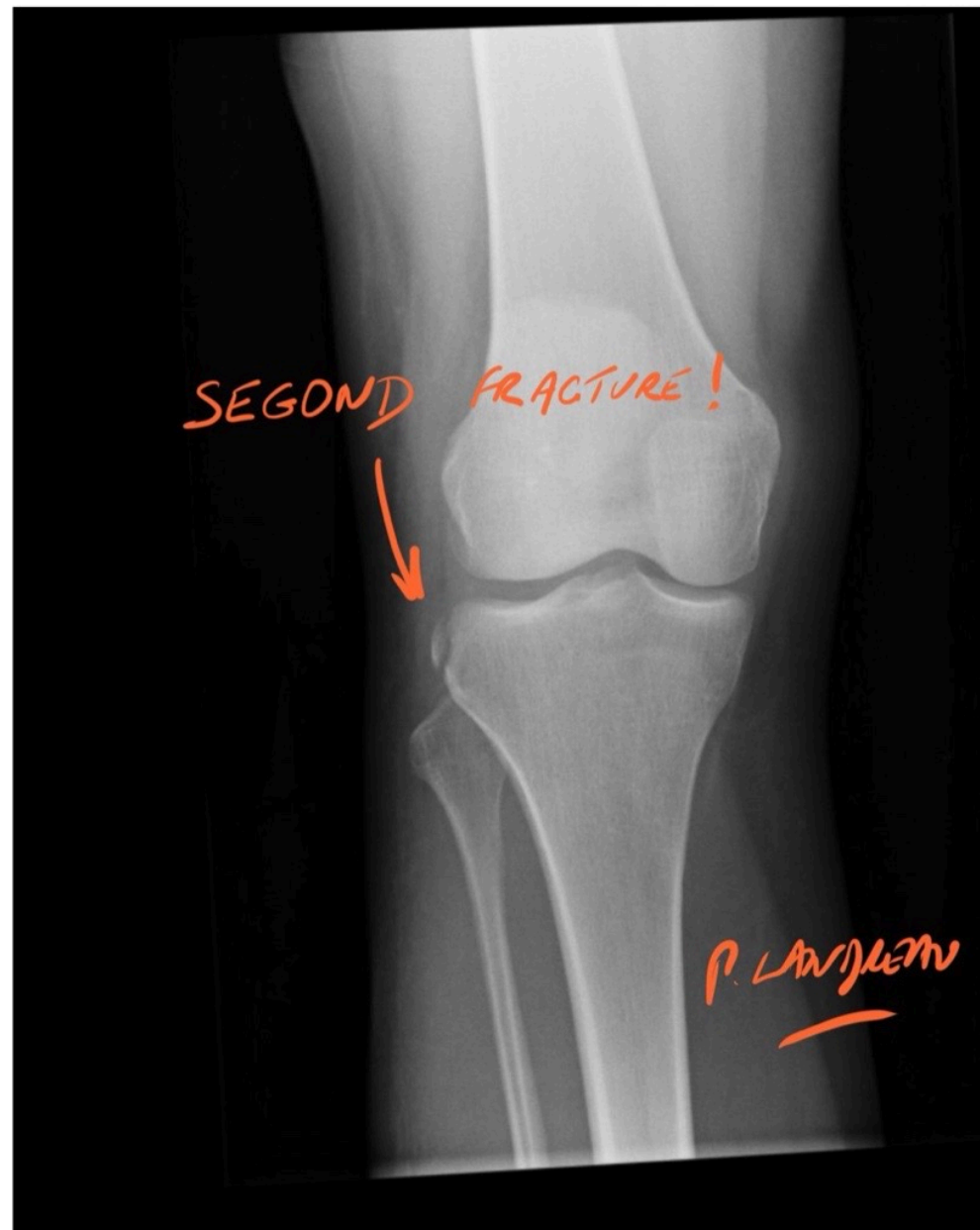
- a. Positive lachman test
- b. Positive McMurray's test with leg internally rotated
- c. Positive McMurray's test with leg externally rotated
- d. Positive external rotation dial test with knee flexed at 30 degrees
- e. Positive posterior drawer test

Answer: a

**Segond's fracture** : avulsion fracture of the lateral tibial plateau, [next slide](#), if present, 95% there is ACL injury.

Special tests for ACL injury: anterior drawer test, **lachman's test** (most sensitive) & pivot test.

## Segond fracture



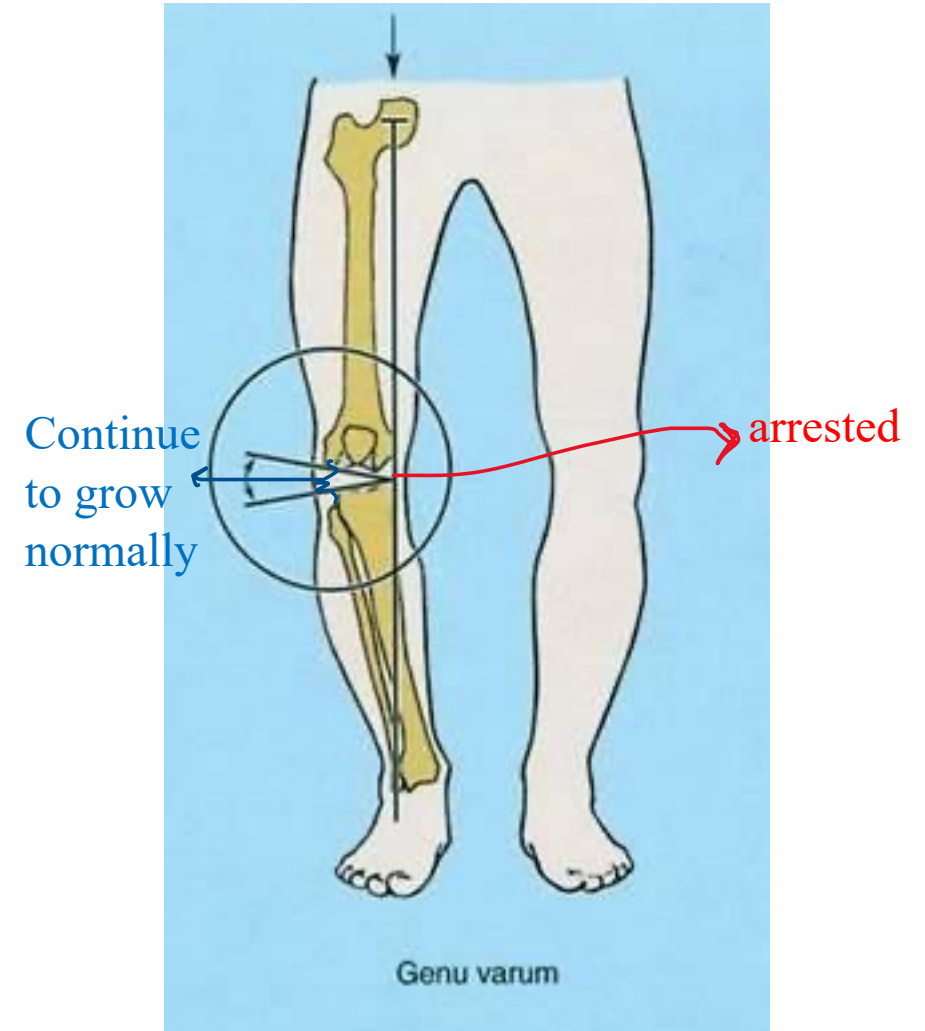
Q20. Genu Varus following proximal tibial growth plate injury, results from:

- a. Injury to the medial side of the growth plate
- b. Injury to the lateral side of the growth plate
- c. Injury to the anterolateral side of the growth plate
- d. Injury to the anterior side of the growth plate
- e. Injury to the posterior side of the growth plate

Answer: a

Medial arrest → varus (bow-leg)

Lateral arrest → valgus (knock-knee)



Q21. Pain and numbness at night with thenar atrophy and thumb weakness :

Positive Tinel sign at wrist.

Resources :

- ✓Lectures' slides
- ✓Lectures' notes
- ✓UpToDate
- ✓Dr M. Sameeh handouts
- ✓Dr Fadi's handouts
- ✓Lejan's dossier
- ✓ChatGPT

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