“Paediatric Orthopaedic MCQs”

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Paediatric Orthopaedics -1

Trauma	Lower Limb	SCFE and Perthes	Cerebral palsy	Genes and syndromes
1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

Trauma

1.

A 14-year-old M was referred for treatment of new onset left knee pain. The patient states he fell a week ago and it has been hurting ever since. Was alright before

The patient's radiographic imaging notes a 1.2cm shorter femur of left limb without any fractures.

Upon discussion, the mother states she always knew her son had slightly offsetting limb lengths. Which of the following is the next best step in management?

1. Await skeletal maturity then perform corrective left limb lengthening
2. Right Distal femur epiphysiodesis
3. Right Proximal Tibia epiphysiodesis
4. Observe

1.

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Answer 1.

4. Observe

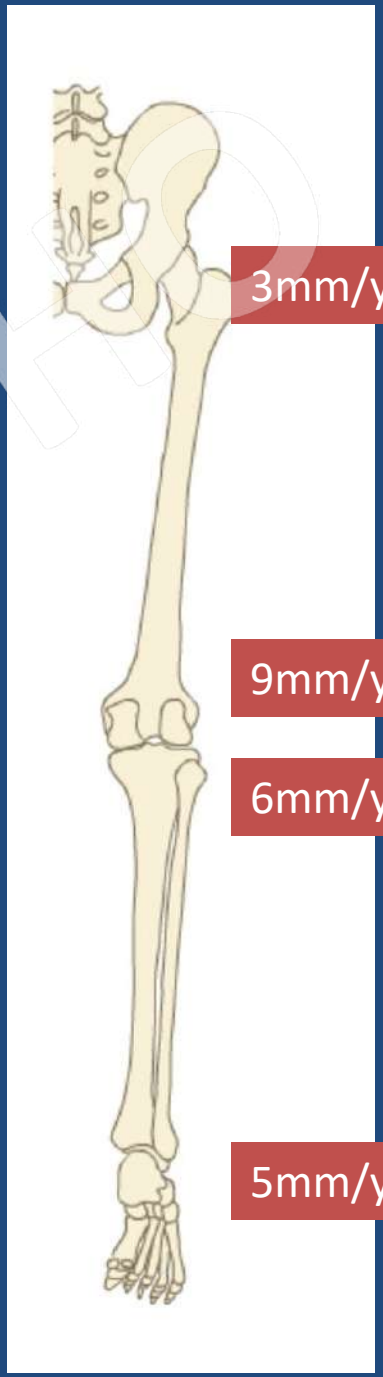
Expected adolescent growth rates:

- Proximal femur: 3mm
- Distal femur: 9mm
- Proximal tibia: 6mm
- Distal tibia: 4mm

<2cm : No treatment or Shoe lift

>2 <4-5 cm: Contralateral epiphysiodesis

>5cm Limb Lengthening



2.

Which of the following is not used to predict limb growth and LLD

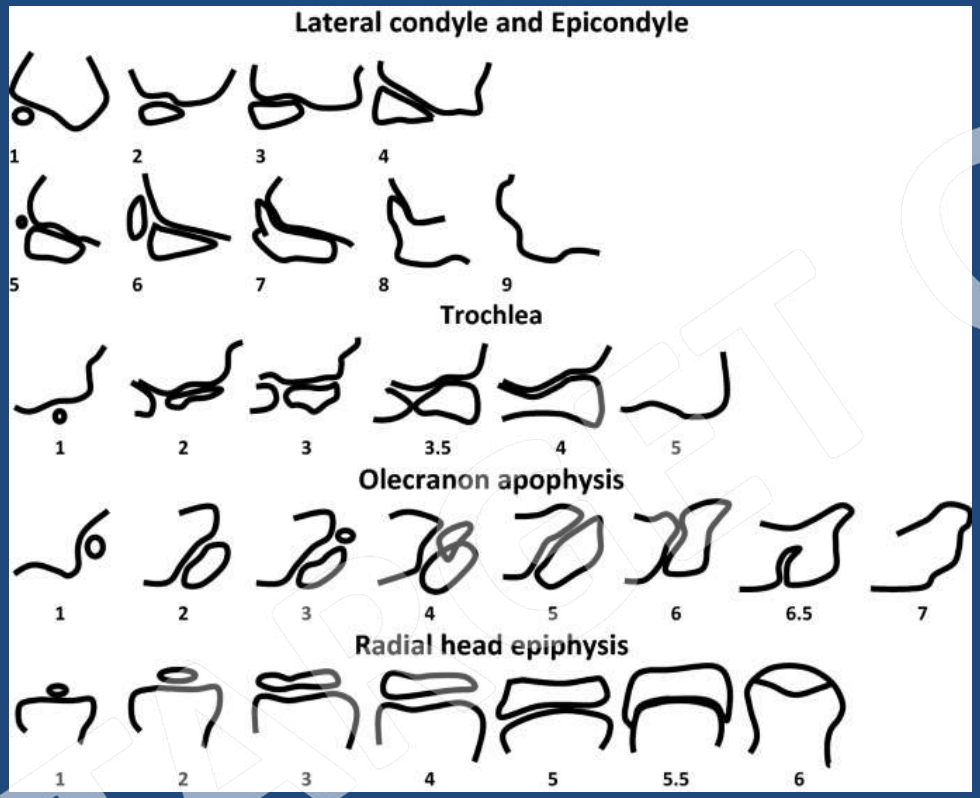
1. Moseley's Graph
2. Green-Anderson tables
3. Greulich Pyle scale
4. Risser

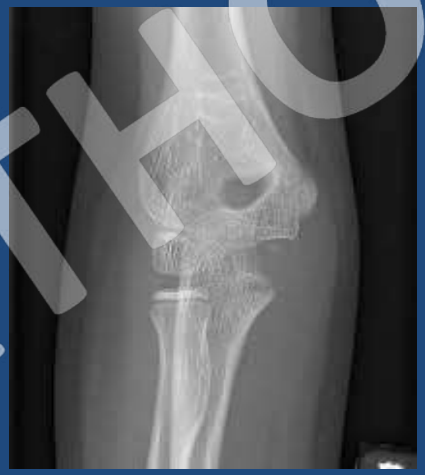
Answer 2.

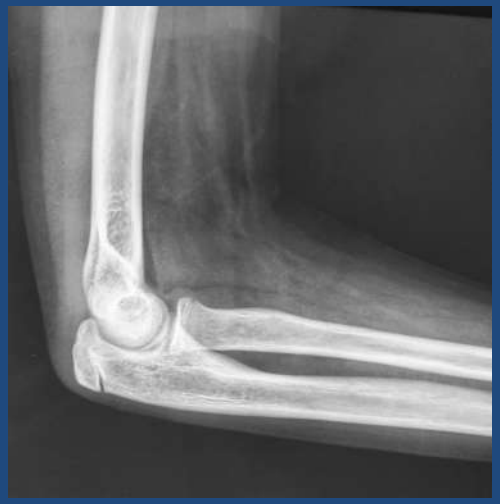
4. Risser is used for Scoliosis Growth prediction

1. Moseley's Graph
2. Green-Anderson tables
3. Greulich Pyle scale
4. Paley multiplier method
5. Sauvegrain method
6. Humeral Head

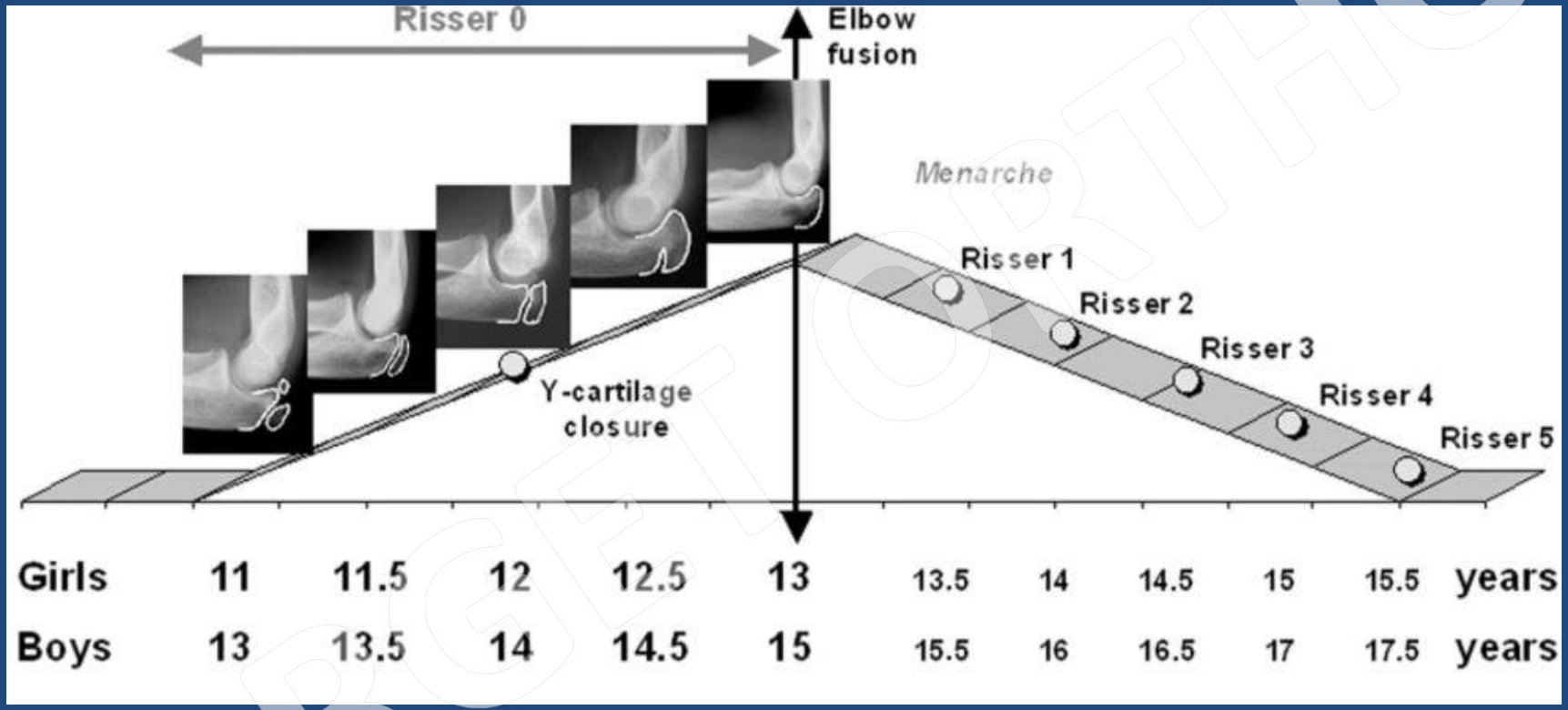
Sauvegrain



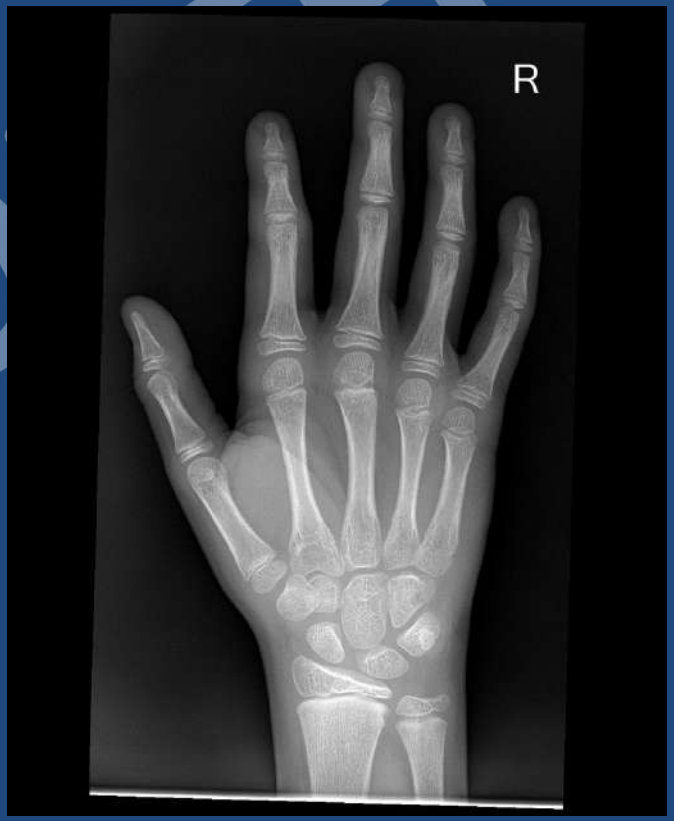




Peak height velocity



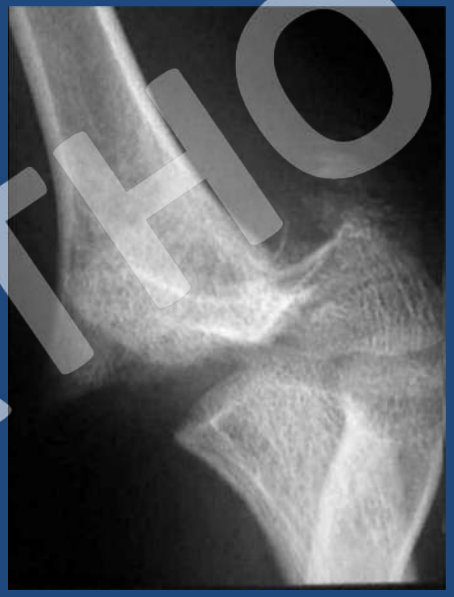
Open Phalangeal physis

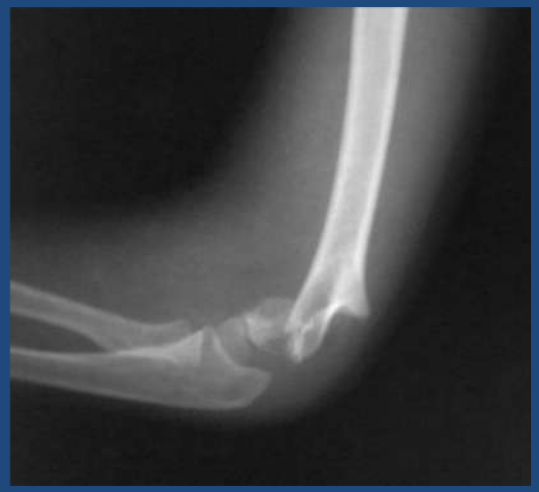


3.

What is the fracture type shown in the image?

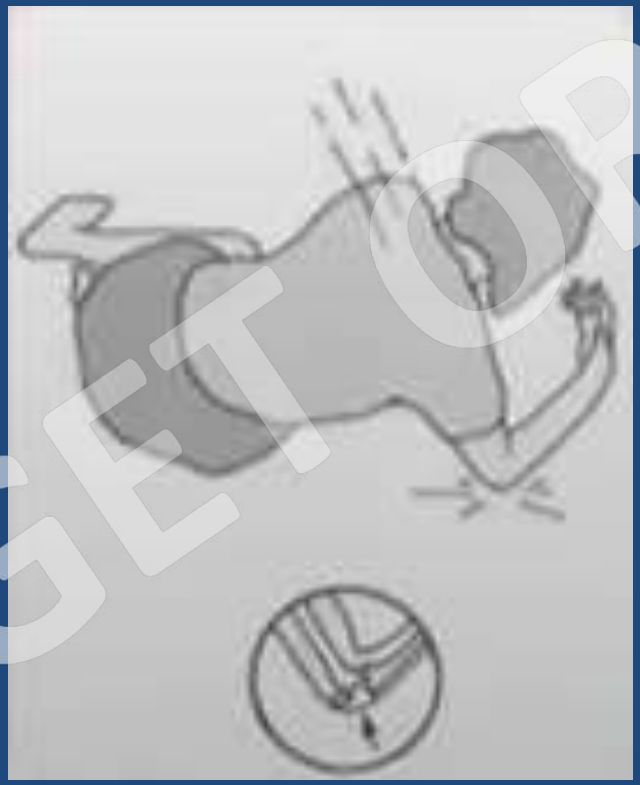
1. Gartland type 2a
2. Gartland 2b
3. Gartland 3
4. Flexion

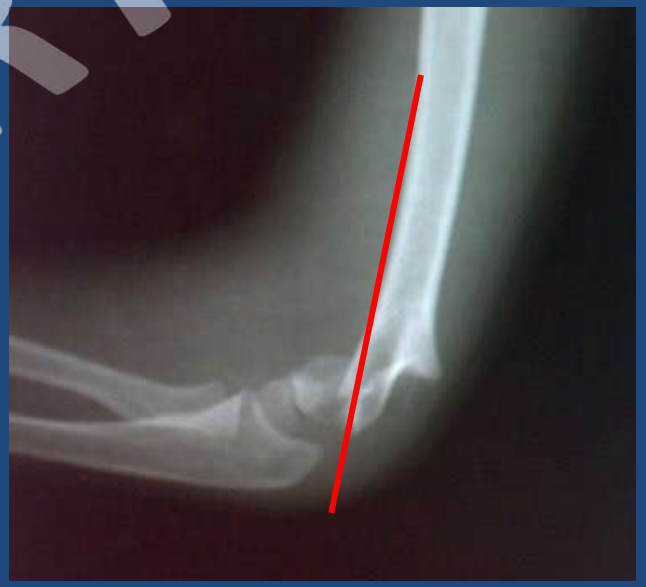




Answer 3.

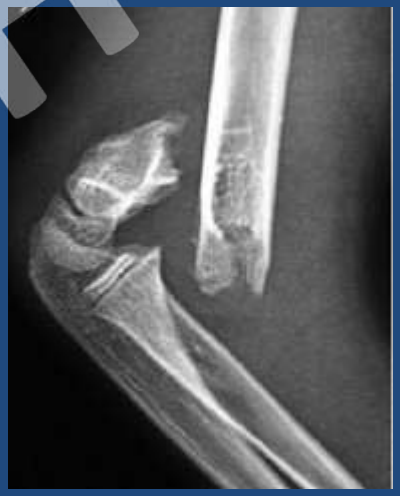
4. Flexion type supracondylar humerus fracture



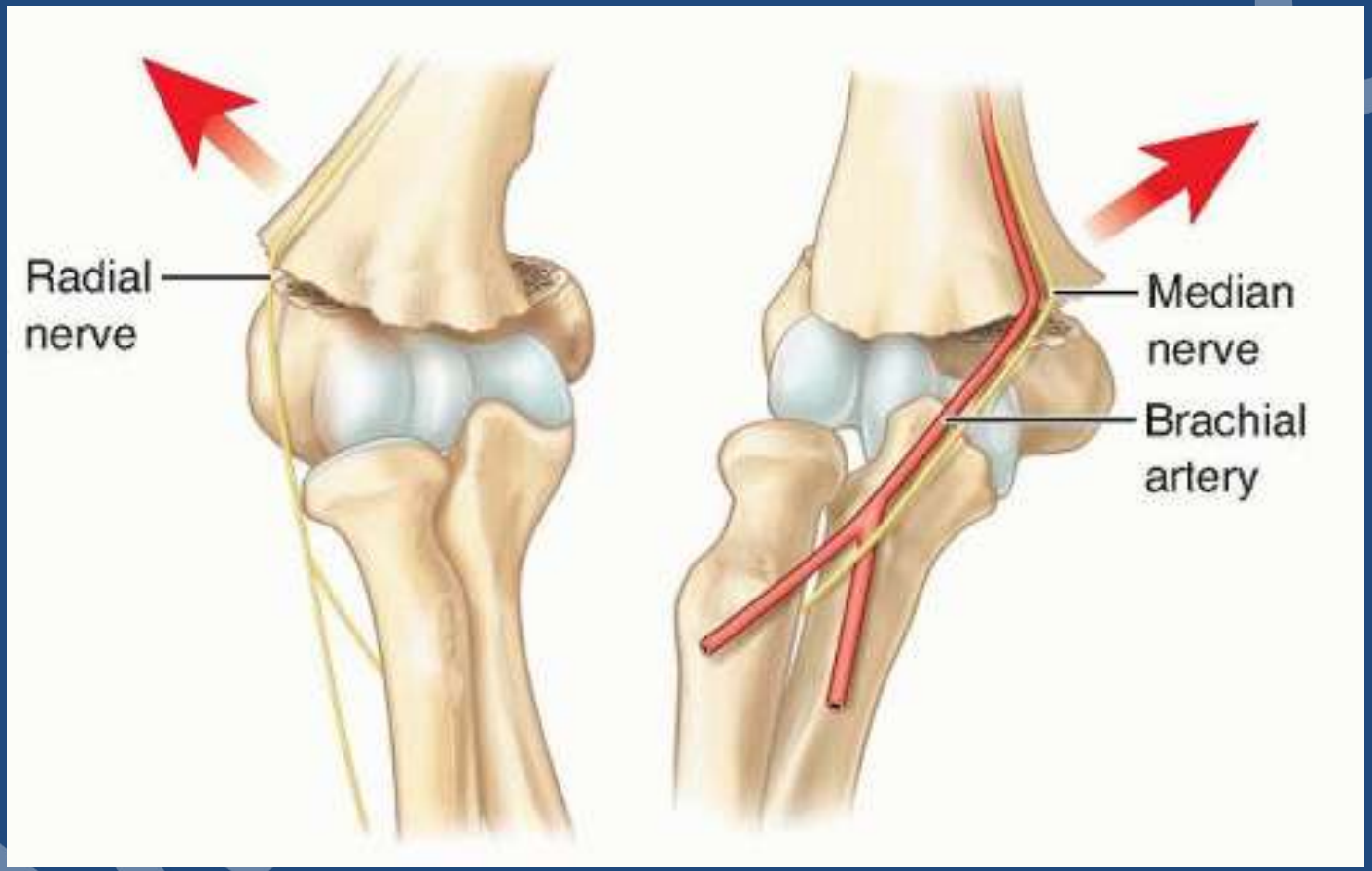


4.

A 7-year-old girl falls in the park and sustains the injury depicted in Figure. The most commonly observed nerve injury would result in deficits in which of the following muscles?



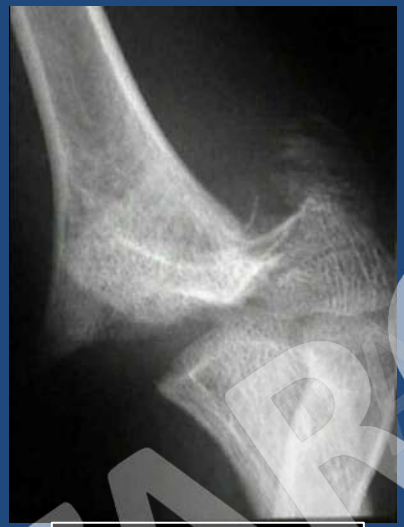
1. Dorsal Interossei
2. Palmar interossei
3. Extensor policis longus
4. Flexor policis longus


Radial nerve
Median nerve
Brachial artery

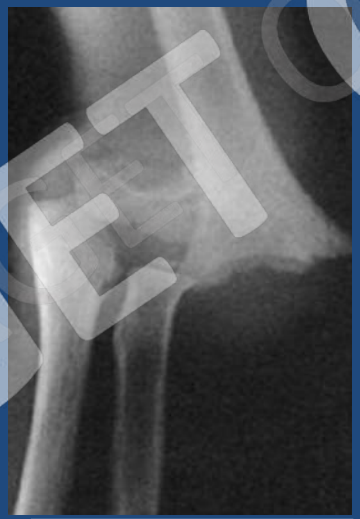
AIN Palsy
12-15%

PIN Palsy
8%

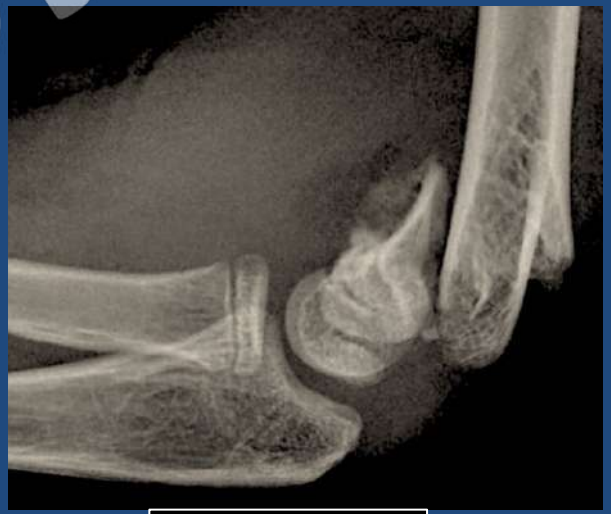
Ulnar Palsy
3%



Posterolateral



Posteromedial



Flexion type


TARGET ORTHO

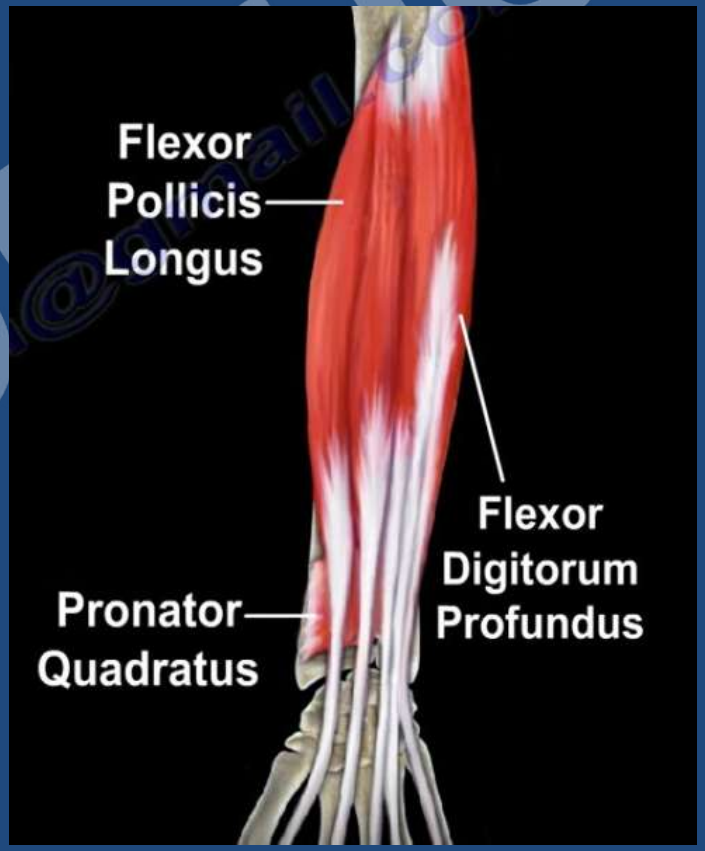
Answer 4.

AIN palsy is the M/C neuropraxia after pediatric extension-type supracondylar humerus #.

The AIN innervates the FPL, PQ, FDP

Most of these neuropraxias resolve with observation

The ulnar nerve is most commonly implicated with flexion-type supracondylar humerus fractures.



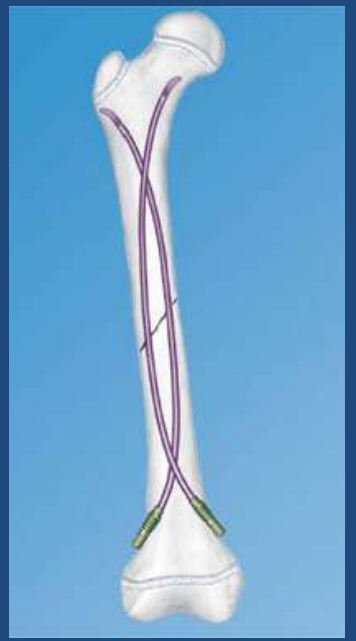
5.

Which is contraindicated in management
Of adolescent pediatric femur fracture?

A

B

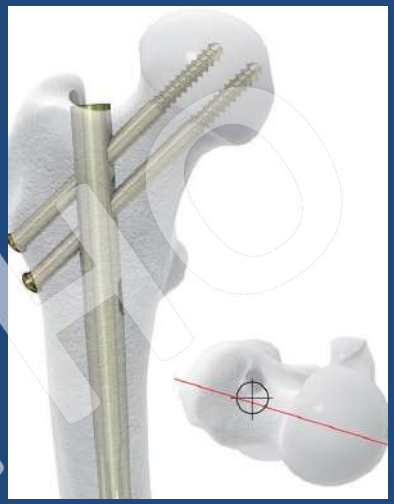
C



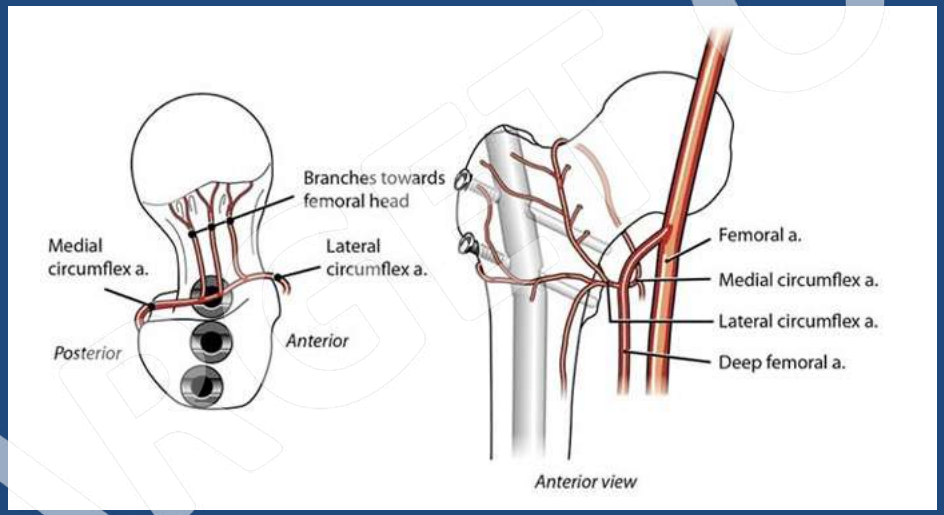
D

Answer 5.

Blood suuply to femoral head near pyriformis.



A

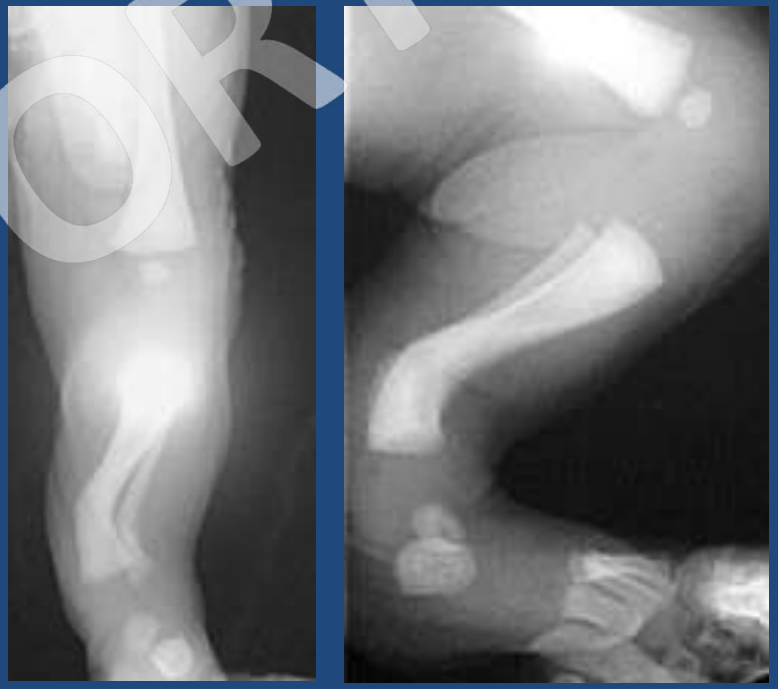


Lower Limb deformity

6.

What is the most common deformity associated with the deformity shown in picture?

A. CTEV
B. Metatarsus Adductus
C. Calcaneovalgus foot
D. A and C



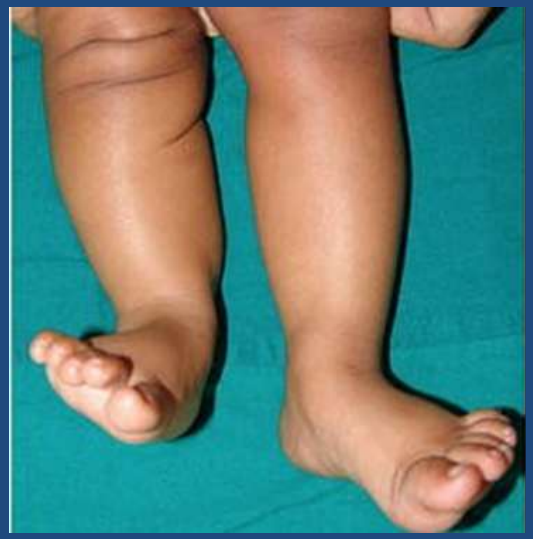
Answer 6.

The radiographs show a child with posteromedial bowing of the tibia.

This is a congenital anomaly that is produces the appearance of a **calcaneovalgus** foot deformity and is associated with it.

It is important to differentiate this condition of a positional **calcaneovalgus** deformity which has its apex of deformity at the ankle joint and is secondary to intra-uterine positioning.

Posteromedial tibial bowing demonstrates an **apex of deformity at the distal leg** and it readily apparent on radiographs. It is a relatively benign condition.



Calcaneovalgus vs PM Bowing

This condition is quite different from anterior lateral bowing that can be associated with neurofibromatosis and pathologic fracture or pseudoarthrosis of the tibia which should be prevented by early bracing.

Fractures are uncommon in posteromedial bowing.

7.

Q. What is the major deformity which needs correction in a case with congenital posteromedial bowing of tibia?

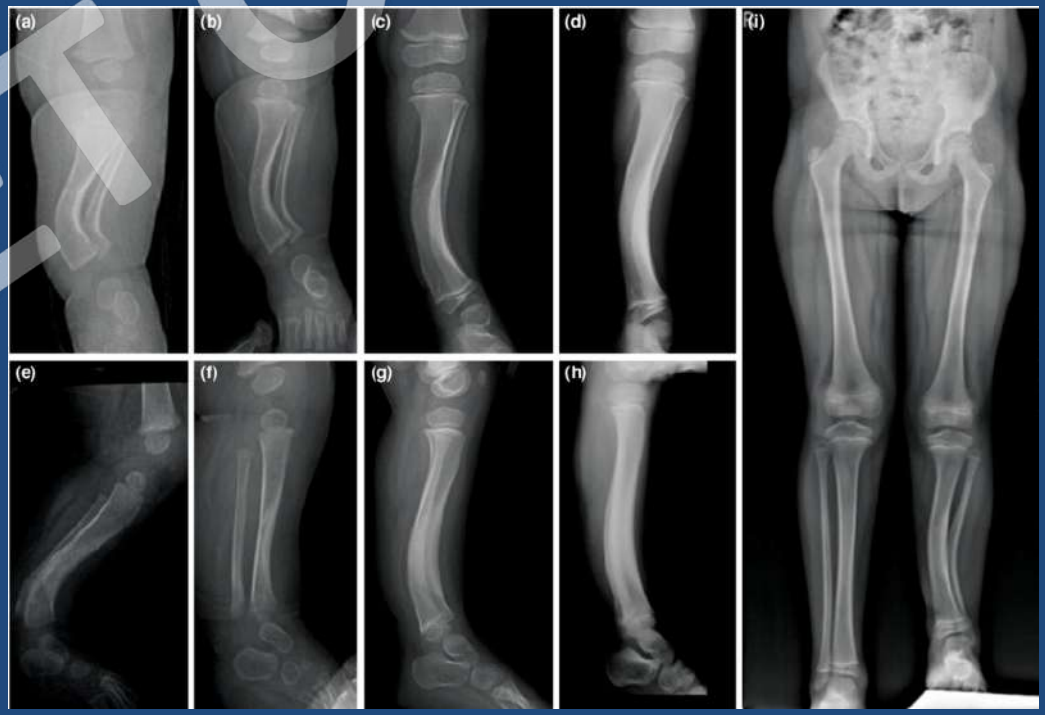
A. LLD
B. None of the deformity, All remodel
C. Posterior bowing
D. Medial bowing

Answer 7.

Though the posterior bow is the more severe deformity than the medial bow, both bows tend to correct by itself in most of the cases. The major deformity which remains is shortening.

Tibial and fibular shortening, ranging from 3 to 7 cm at skeletal maturity, is the usual, and most severe, long-term consequence of congenital posteromedial bowing.

The degree of shortening is proportionate to the amount of bowing.



8.

Which of the following is seen in a child with adolescent blount disease?

1. Bilaterality
2. Self resolution
3. Associated distal femoral varus
4. Bracing is first line of management

Figure 2

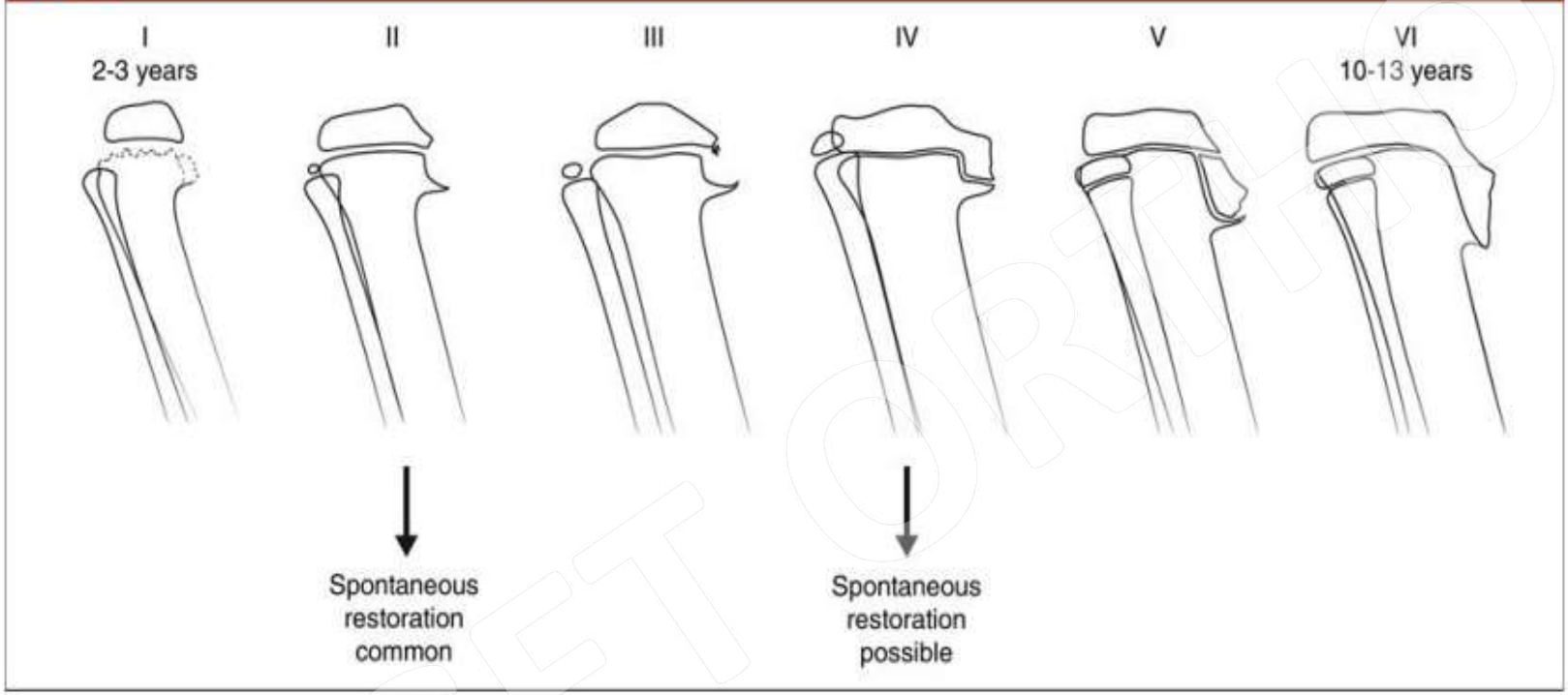


Illustration of Langenskiöld's radiographic classification of infantile Blount disease demonstrating six progressive stages from mild medial epiphyseal-metaphyseal beaking (stage I) to complete medial proximal tibial physeal arrest (stage VI). Spontaneous correction occurs commonly in stage II lesions and occasionally in stage IV lesions. (Adapted from Langenskioeld A, Riska EB: Tibia vara [osteochondrosis deformans tibiae]: A survey of seventy-one cases. *J Bone Joint Surg Am* 1964;46:1405-1420.)

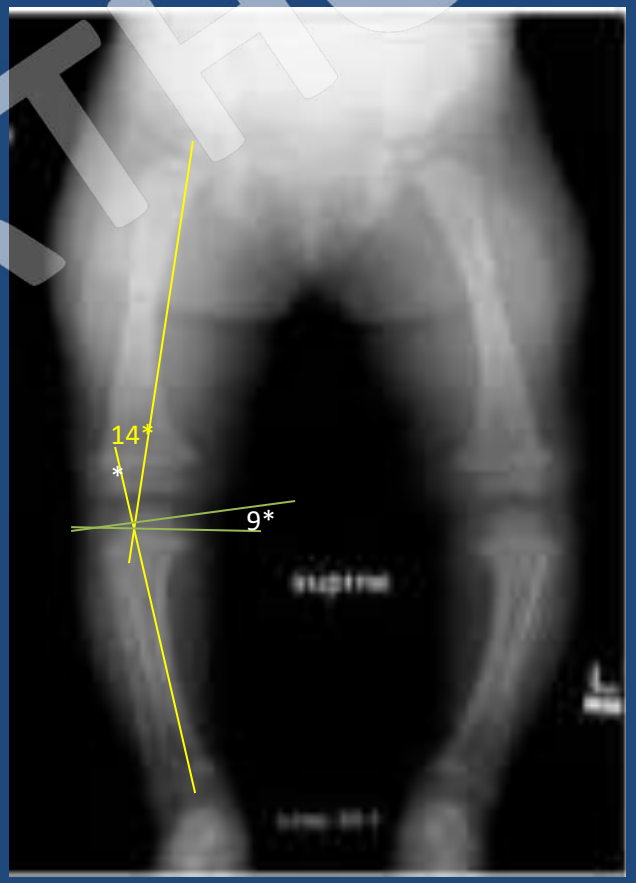
Answer 8.

	Adolescent blount	Infantile blount
Side affection	Unilateral> Bilateral	Bilateral ~50%
Self resolution	Langeskiold 2 and 4 before 4 years of age	Unlikely
Primary management	Bracing	Surgery
Associated deformity	**Distal Femoral Varus and distal tibia valgus.**	Compensatory distal femoral valgus. Internal tibial torsion.
Physeal changes	Mild	Present (Langeskiold); Even progressive

9.

The image above is of a 1 year old boy with the angles as shown. The parents complain of the Bowed legs and the O appearance now that he has started walking. Which of the following is correct?

1. The measurements are with the normal limits for the age and pathology.
2. The condition is primarily coming from Tibia and will need bracing
3. The condition is primarily coming from Tibia, bracing will be ineffective and will likely need surgery.
4. The condition will correct by just Oral Vit D3 supplementation

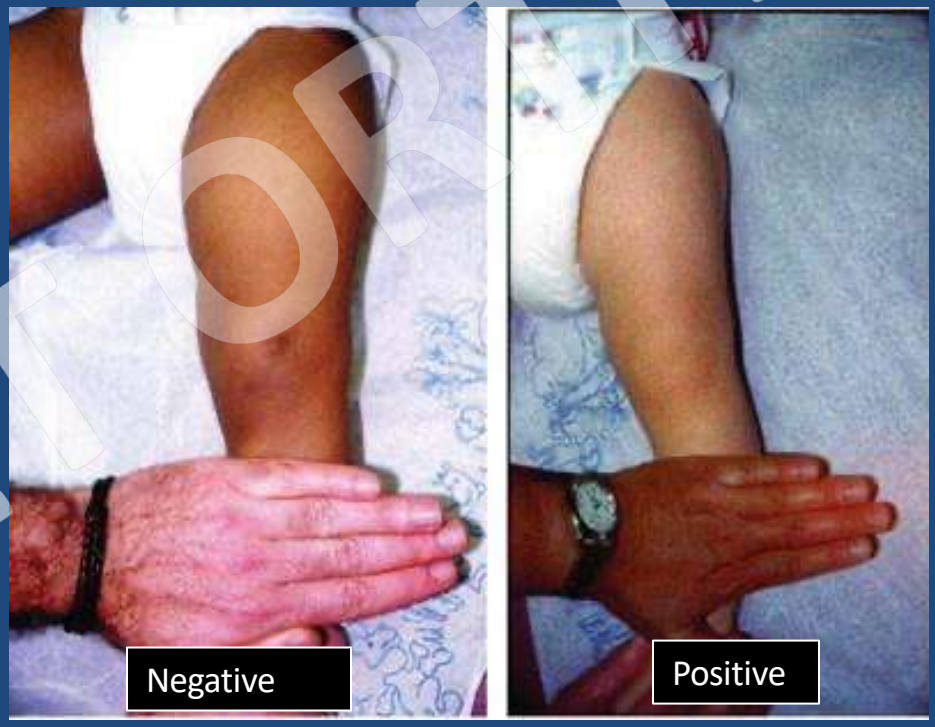


Cover Up test (1-3 years)

Positive test -→ Imaging

Varus/ Neutral- Positive

Valgus- Negative

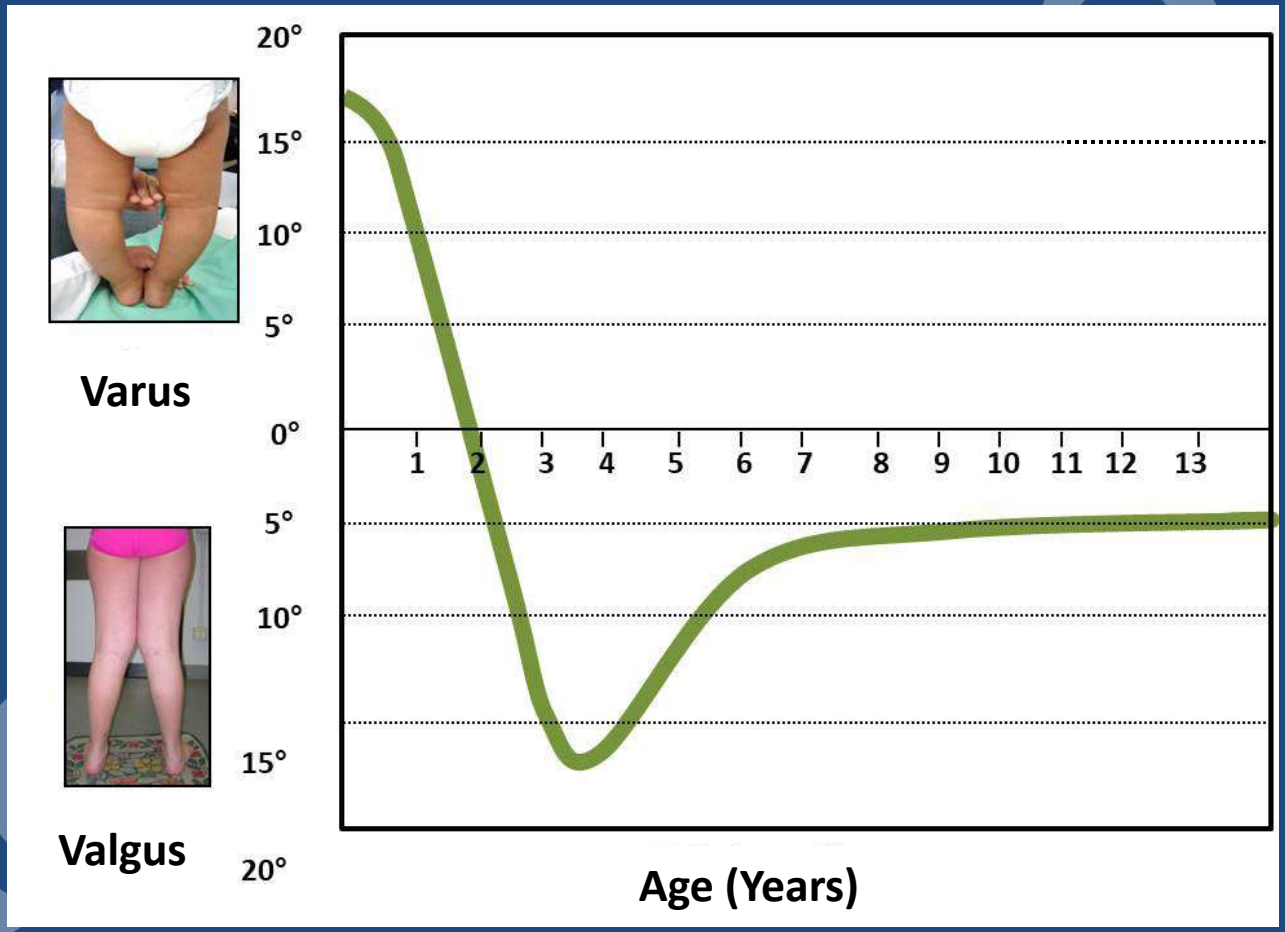


Genu varum, / bowlegs, is a common presenting complaint.

The **'cover up'** test qualitatively assesses the alignment of the proximal portion of the shank or lower leg relative to the thigh or upper leg.

Obvious valgus alignment is considered a negative test and is indicative of physiologic bowing. Neutral or varus alignment is considered a positive test and suggests that the child is at greater risk for having infantile tibia vara.

Physiologic Variations

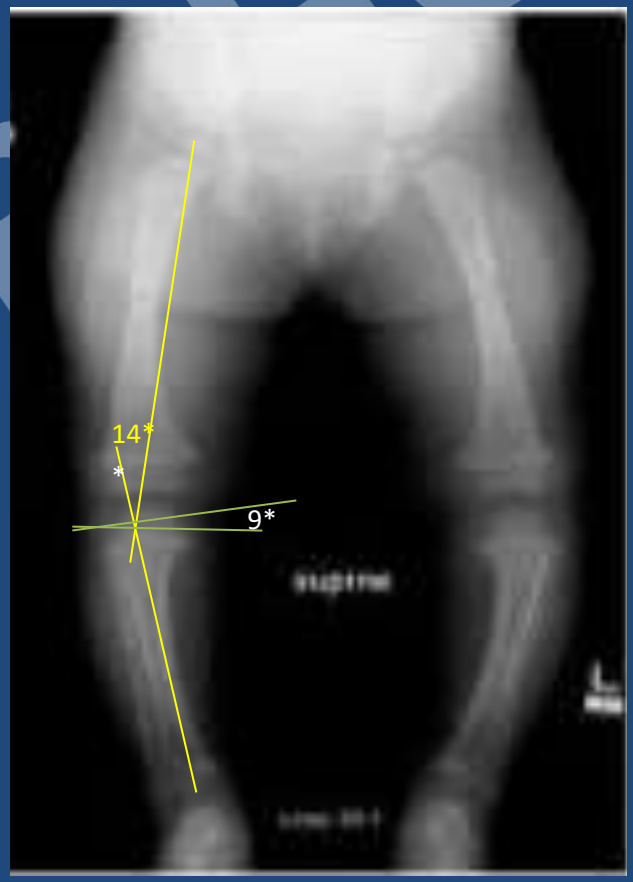


SALENIUS CURVE

Answer 9.

Metaphyseal-diaphyseal angle greater than 16 is considered abnormal and has a high chance of progression. Metaphyseal-diaphyseal angle less than 10 degrees has a 95% chance of natural resolution of bowing.

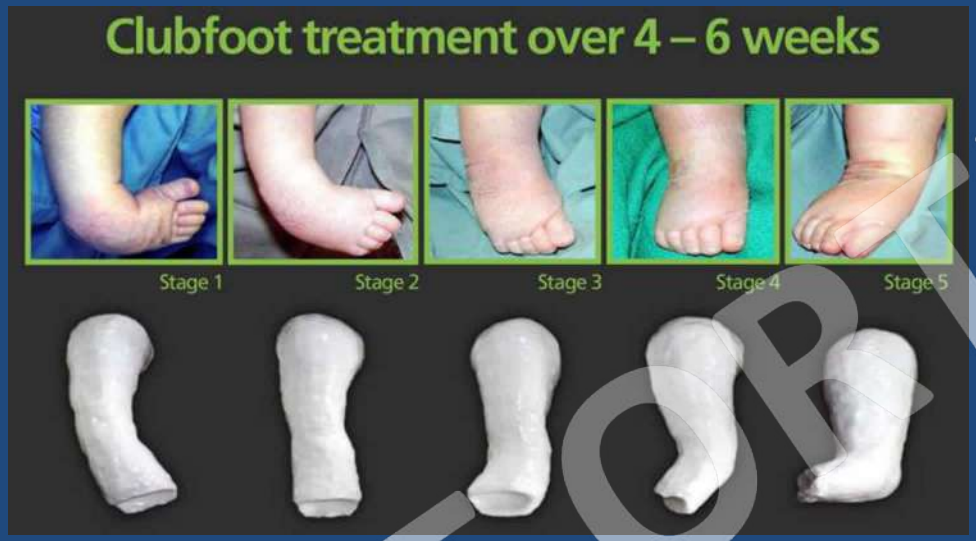
1. The measurements are with the normal limits for the age and pathology.



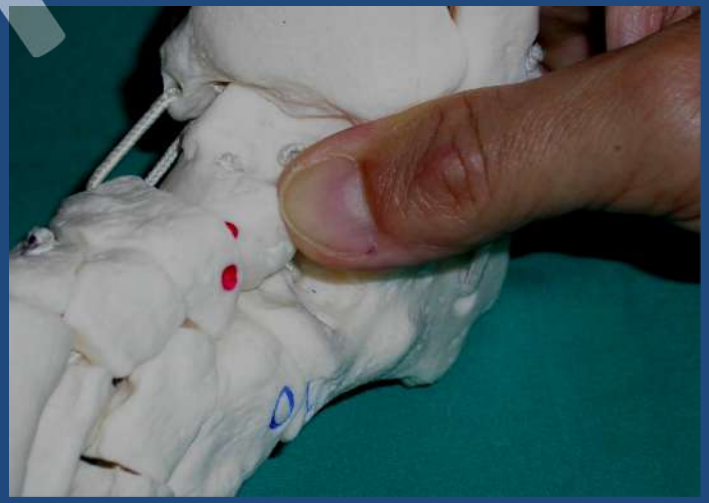
10.

Ponseti method of treatment for clubfoot involves all the following principles except:

1. Elevation of the first metatarsal head in the first plaster
2. Thumb pressure on the talar head
3. Gradual increase in abduction so as to bring about 50o of abduction before tenotomy
4. Forceful dorsiflexion of the ankle as the last step in order to correct equinus



Reduction of TN Joint is the key in treatment

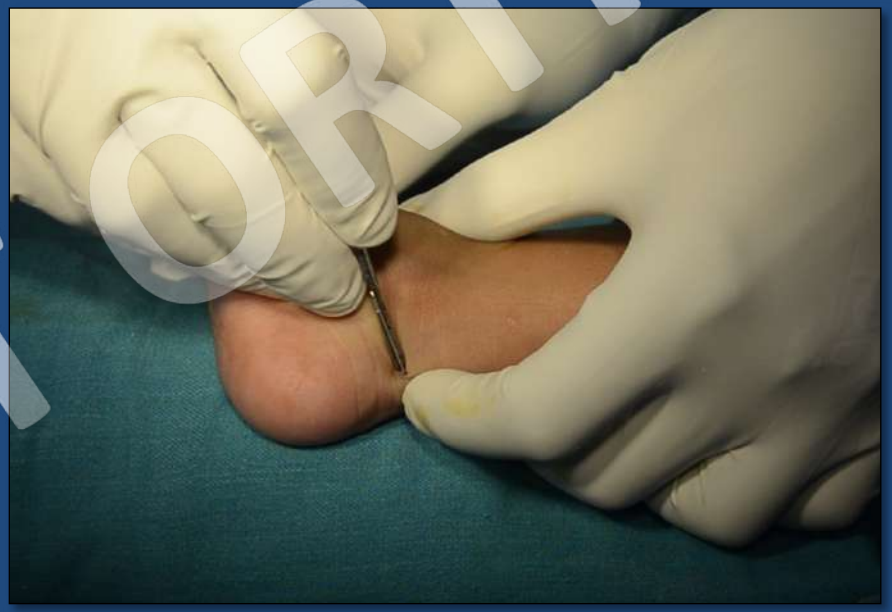


TA Tenotomy

Performed under LA

Medial to lateral

Peroneal artery more commonly injured



-Loss of resistance

-Sudden increase in DF

-*Pop*

Answer 10.

4. Forceful Dorsiflexion

C- A - V - E

Tenotomy before dorsiflexion, Otherwise Rockerbottom (Pseudo dorsiflexion)

SCFE and Perthes

11.

An obese 10-year-old boy complains of pain in his right knee. There is no history of fever or trauma. On physical examination, there is no swelling or tenderness of the knee. His right leg is rotated externally, and he walks with a limp. Of the following, the MOST likely diagnosis is:

(a) avascular necrosis of the femoral head
(b) iliotibial band syndrome
(c) right anterior cruciate ligament tear
(d) slipped capital femoral epiphysis

Answer 11.

D. Slipped capital femoral epiphysis

12.

For children with Legg-Calve-Perthes(LCP) disease, all of the following factors are associated with femoral head incongruity and worse clinical outcome EXCEPT:

1. Maintenance of <50% HEIGHT
2. Presentation <5 years of age
3. Lateral subluxation
4. Calcification lateral to epiphysis

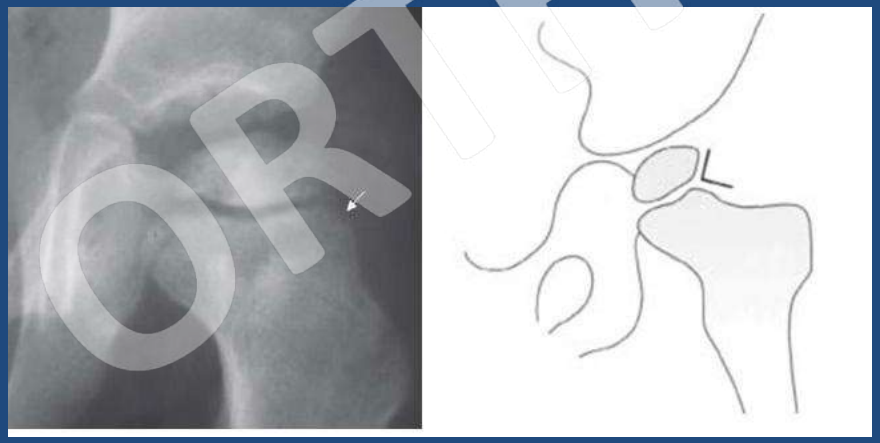
Answer 12.

2. Presentation < 5 years

Head at risk signs by Catterall

(During active stage)

- **C**alcification lateral to epiphysis
- **G**age Sign
- **M**etaphyseal Cyst
- **L**ateral subluxation
- **H**orizontal proximal femoral epiphysis



***C**atterall **g**ave **m**e **l**arge **h**eadache*

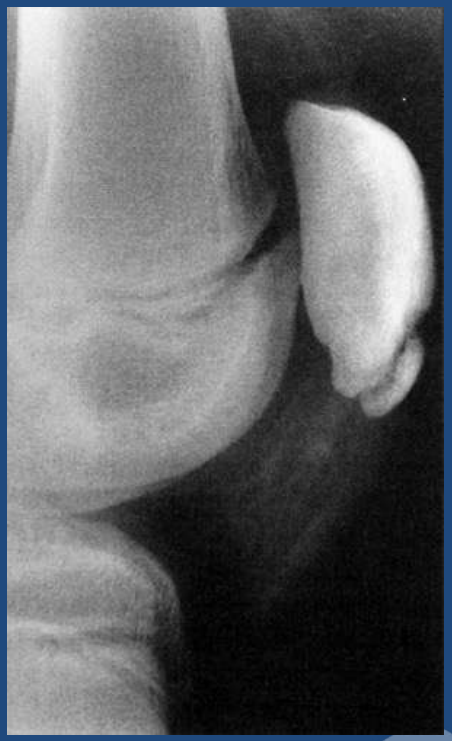
Variable	Contain	DO NOT Contain
Age	>6 or <6 With extrusion	<6 (No extrusion)
Extent of involvement	Half or more of epiphysis	Less than half of epiphysis
Stage of evolution of the disease	Stage Ia, Ib, Iia and ?Stage Iib	Stage IIIa, IIIb, IV
Extrusion	Present	Absent (<7 Year)
Range of Hip motion	Normal	Restricted

13.

A 12 year old soccer player presents with recent onset knee pain. On exam points to patellar tendon attachment on patella. Pain is associated with activity. Likely diagnosis?

1. Osgood Schlatter
2. Patellofemoral pain syndrome
3. Sinding Larsen Johansson
4. Osteochondritis dissecans

Answer 13.



Sever- Calcaneal
Osgood Schlatter - Tibial Tuberosity
Kohler - Navi(kohler)

Islene - 5th Metatarsal base
Frieberg - 1-4 Metatarsal head

Is - Berg

Panner - Capitellum
Hegemann - Trochlea
Kienbock - Lunate
Sinding Larsen Johannson - Patella
Scheurmann - Vertebrae

14.

Most dreaded complication of SCFE surgery is

1. Chondrolysis
2. AVN
3. Hip dislocation
4. Coxa vara

Answer 14.

2. AVN

15.

- A Child presents with intoeing. The surgeon is deciding on whether the child needs surgery. According to Staheli, which one the following is not an indication for surgery?

1. Child older than 8 years
2. Anteversion exceeding 50 degrees
3. Medial hip rotation greater than 35 degrees
4. Lateral hip rotation lesser than 10 degrees

Intoeing gait

Answer 15.

Ans: 3

Staheli listed 5 indications for surgical correction of Femoral anteversion –

(1) child older than 8 years
(2) deformity severe enough to create a significant cosmetic and functional disability
(3) measured anteversion exceeding 50 degrees
(4) internal hip rotation greater than 85 degrees and external rotation of less than 10 degrees
(5) family should be aware of the risks of the procedure

Sx: Femoral derotation osteotomy

Cerebral Palsy

16.

Botulinum Toxin A is one of the drug routinely used in skeletally immature child to treat CP associated dynamic spasticity. The action of Botulinum Toxin A is by which of the following mechanism?

1. Destruction of acetylcholine receptor
2. Binding with the muscle receptors and preventing action
3. Binding to receptors on motor terminals and preventing release
4. 2+3

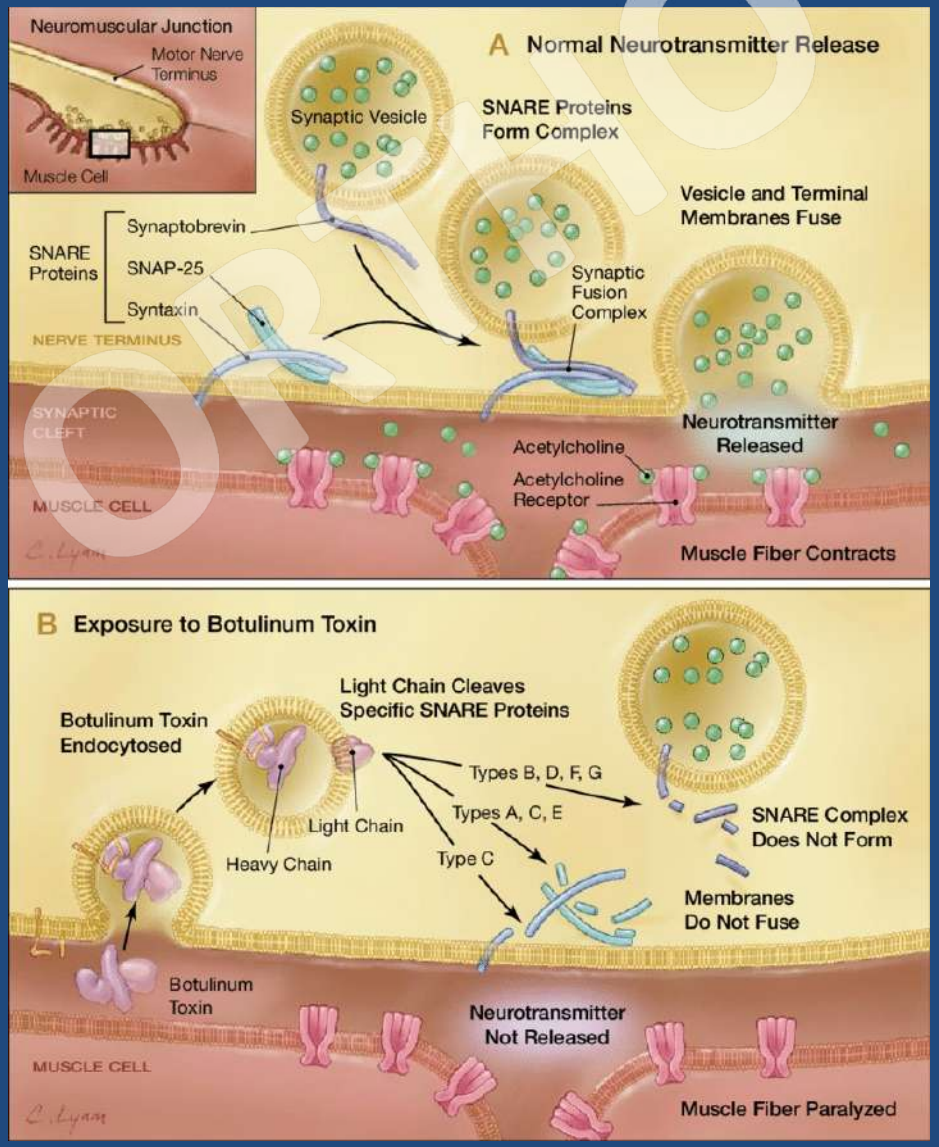
Answer 16.

3.

Botulinum toxin type A blocks neuromuscular transmission by binding to receptor sites, entering the nerve terminals, and inhibiting the **presynaptic** release of acetylcholine.

As the release of acetylcholine is stopped it leads to flaccid paralysis of the muscle.

The toxin is injected into the spastic muscle belly as near to the nerve supply and far from the tendinous part.



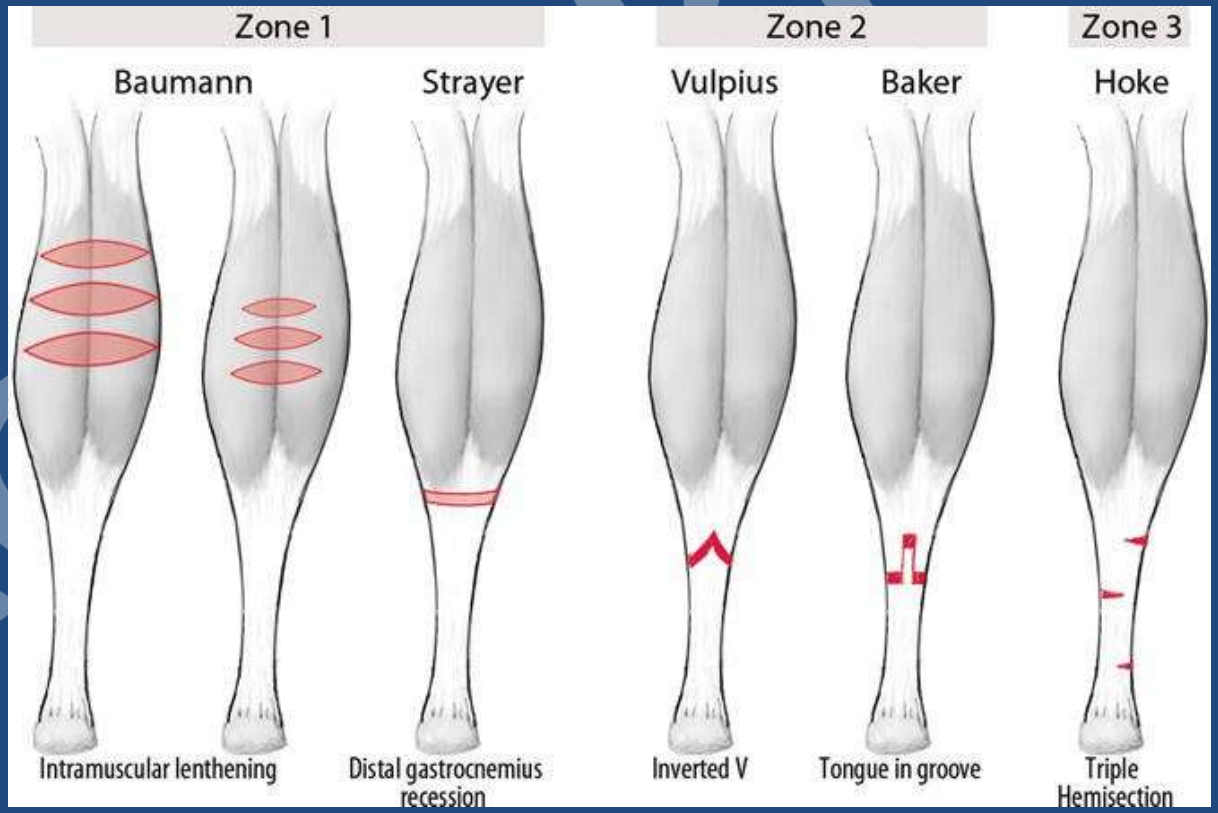
17.

Hoke's lengthening for equinus contracture of a spastic hemiplegic foot occurs in what zone of the Gastrosoleus complex?

1. Zone 1
2. Zone 2
3. Zone 3
4. Zone 2 + 3

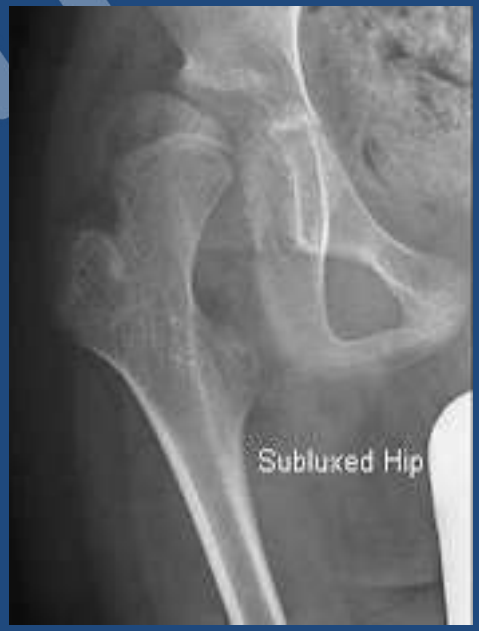
Answer 17.

Ans. 3.



18.

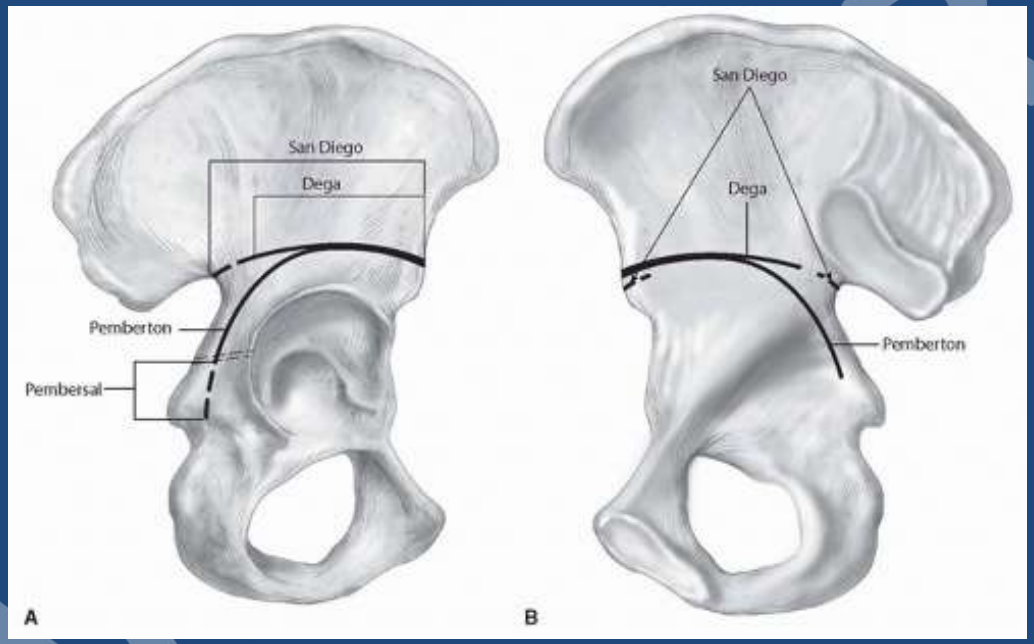
An 8-year-old female with SDCP, GMFCS 4, is brought to your clinic by her parents for evaluation of her right hip pain. On exam, she is noted to have a flexion and adduction contracture. Her radiograph is shown in Figure. Hip reconstruction is planned. Which of the following is the primary benefit to the Dega osteotomy in this patient population?



1. No need for Bone graft
2. Ability to perform before and after Triradiate closure
3. Provides posterior coverage
4. Use as salvage

Answer 18.

3. Provides posterior coverage



19.

Cerebral palsy is also known as:

(a)Rett’s disease

(b)Still’s disease

(c)Little’s disease

(d)Wernicke’s disease

Answer 19.

C. Little’s disease

Cerebral palsy was first described by William Little in 1862 and called Little's disease.

Answer 20.

Genes and Syndromes

21.

. In Achondroplasia, what region of the physis is affected and what is defective?

1. Zone of hypertrophy, FGF,3
2. Zone of proliferation, FGFR 3
3. Zone of hypertrophy, FGFR 3
4. Zone of proliferation, COMP

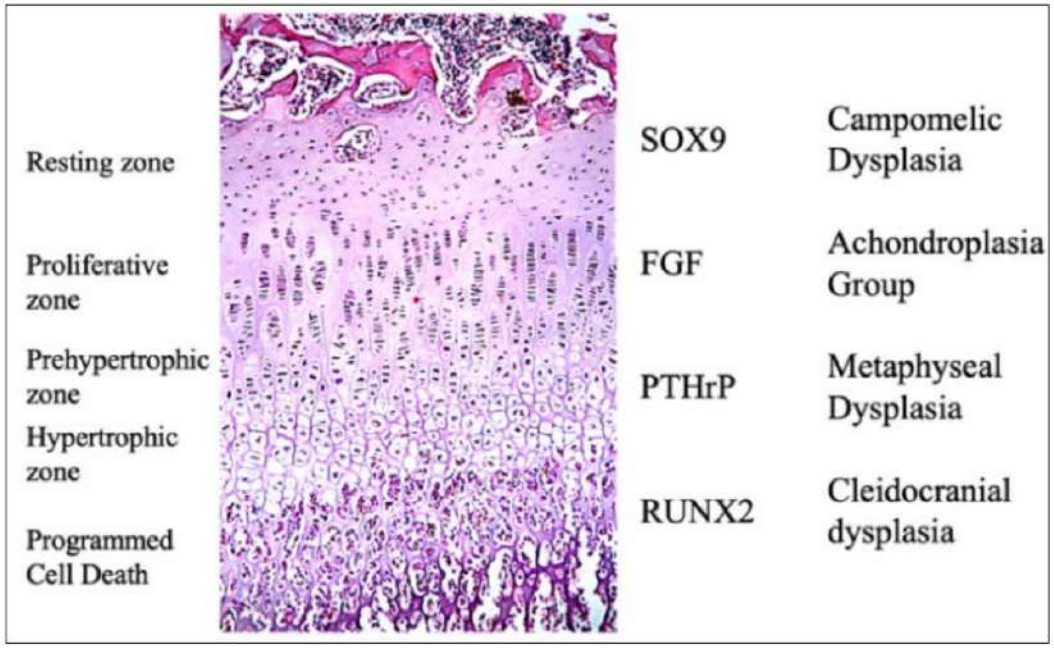


Figure 8. *Demonstration of the different histologic regions of the growth plate (left), with important regulatory functions within the growth plate. Defects in these molecular developmental regulators result in different bone dysplasias (right).*

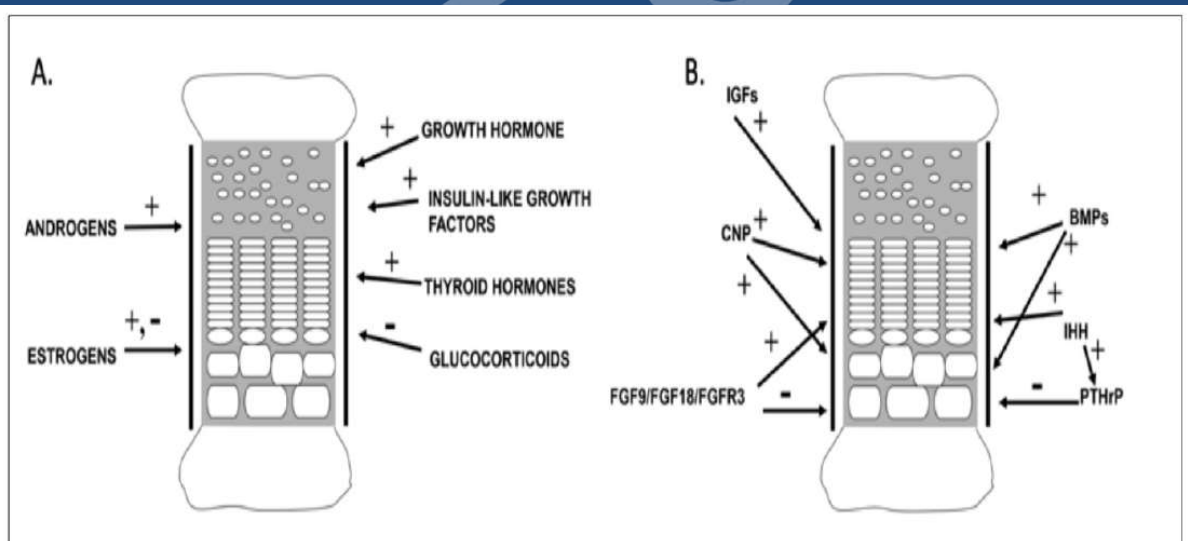


Figure 9. *Schematics of the (A) Endocrine regulation of the growth plate and (B) the Paracrine regulation.*

Answer 21.

Achondroplasia is an AD condition, mutations in **FGFR3 on chromosome 4** leading to a gain of function of FGFR3 (turned on).

This causes **increased tyrosine kinase** activity in the proliferative zone during **enchondral bone formation** at the physis, resulting in the inhibition of chondrocyte proliferation and differentiation.

Inheritance is by **sporadic mutation** in majority of cases.

It has an **Autosomal dominant** pattern of transmission

Achondroplasia

It is the most common type of dwarfism (80-90% of all dwarfism)

- Patients classically have rhizomelic dwarfism.
- Frontal bossing of the forehead,
- Trident hands (All finger same size. Divergence between middle and ring finger)
- Bowing of the legs, (Genu Varum)
- Thoracolumbar kyphosis and hyperlordosis

- FGFR 3 receptor mutation; Increased tyrosine kinase activity - **Achondroplasia**
- Type I collagen abnormalities - **Osteogenesis imperfecta,**
- Type II collagen abnormalities - **Spondyloepiphyseal dysplasia and Kneist syndrome.**
- COMP is defective - **Multiple epiphyseal dysplasia**
- Mutation in DTDST gene (SLC26A2) on **chromosome 5;** Sulphate transport defects - Diastrophic dysplasia.

22.

Which of the following is associated with achondroplasia?

1. Genu valgum
2. Limb length discrepancy
3. Antantoaxial instability
4. Sleep apnea

Answer 22.

Ans. 4.

Sleep apnea in achondroplasia is known because of associated foramen magnum stenosis. This may be the reason of these children developing sudden infant death syndrome (SIDS). Achondroplasia is commonly associated with Genu varum rather than Valgum. Atlantoaxial instability is seen in MPS IV A (Morquio) syndrome

23.

Which of the following statement is true?

1. 6% of cases with NF type 1 are associated with Congenital pseudoarthrosis of tibia
2. 6% of cases with NF type 2 are associated with Congenital pseudoarthrosis of tibia
3. 50% of cases with NF type 1 are associated with Congenital pseudoarthrosis of tibia
4. 50% of cases with NF type 2 are associated with Congenital pseudoarthrosis of tibia

Answer 23.

1. **6% of cases with NF type 1 are associated with Congenital pseudoarthrosis of tibia**

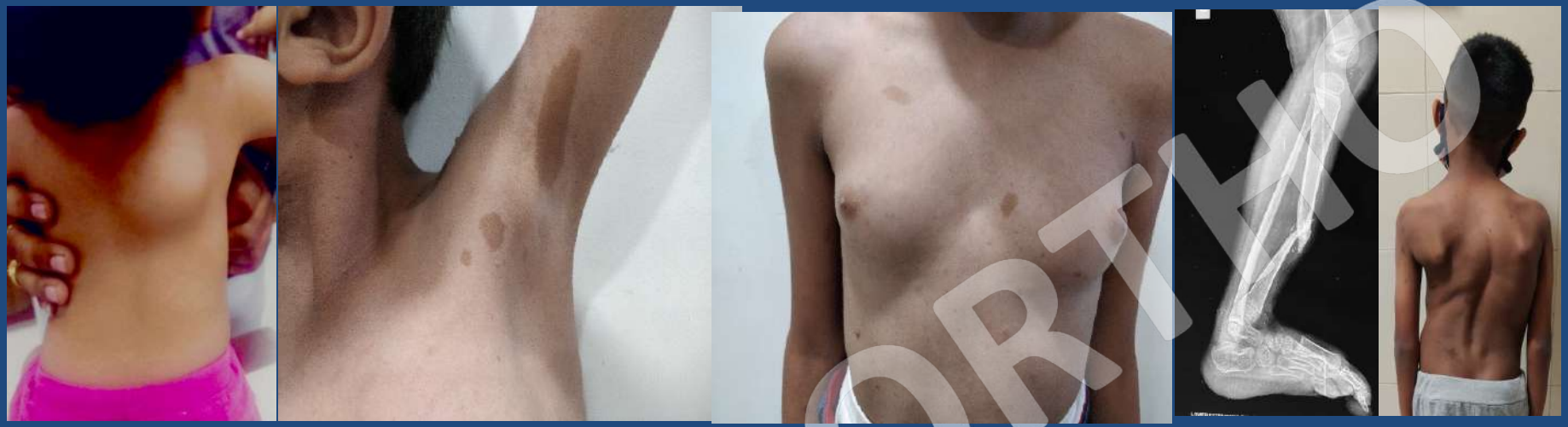
(CPT) is one of the rare and one of the most challenging problem to deal with in paediatric orthopaedics.

The problems with CPT do not end with surgery or even union of CPT as refractures, bowing and LLD are known even after union which is itself a difficult task to achieve.

Approximately 6% of patients with NF type 1 develop deformity of the tibia,

Up to 50-55% of cases of anterolateral bowing and pseudarthrosis are associated with NF.

Because anterolateral bowing of the tibia frequently presents in the first year of life, it may be the first recognized manifestation of NF. The presence of NF does not appear to affect the incidence of union or the ultimate outcome of the tibial pseudarthrosis. Studies have also shown its association with Fibrous dysplasia (15%).



Café-au-lait macules and peripheral nerve sheath tumors (ie, neurofibromas) are the most commonly recognized manifestations of **NF-1.**

Orthopedic manifestations are scoliosis (dystrophic and non-dystrophic), congenital pseudarthrosis of the tibia, and problems related to soft-tissue tumors.

24.

Which of the following is indication of surgery for fixation in CPT?

1. Severe anterior bowing (>45*)
2. Severe lateral bowing (>45*)
3. Pseudoarthrosis
4. Failure of brace to correct deformity

Answer 24.

Ans. 3. Pseudoarthrosis

Pseudoarthrosis formation or development of a fracture at the site of bowing are two of the indications for surgery in CPT. The aim of the surgery is to excise the intervening fibrous tissue and achieve a union between the ends. 1/3rd of the cases of CPT have affection of the fibula also and a fibular and tibial union or a cross union are the goal.

The bowing is not amenable to correction by brace and bracing in congenital pseudoarthrosis of the tibia is with an intent to prevent fracture and thereby psudoarthrosis formation.

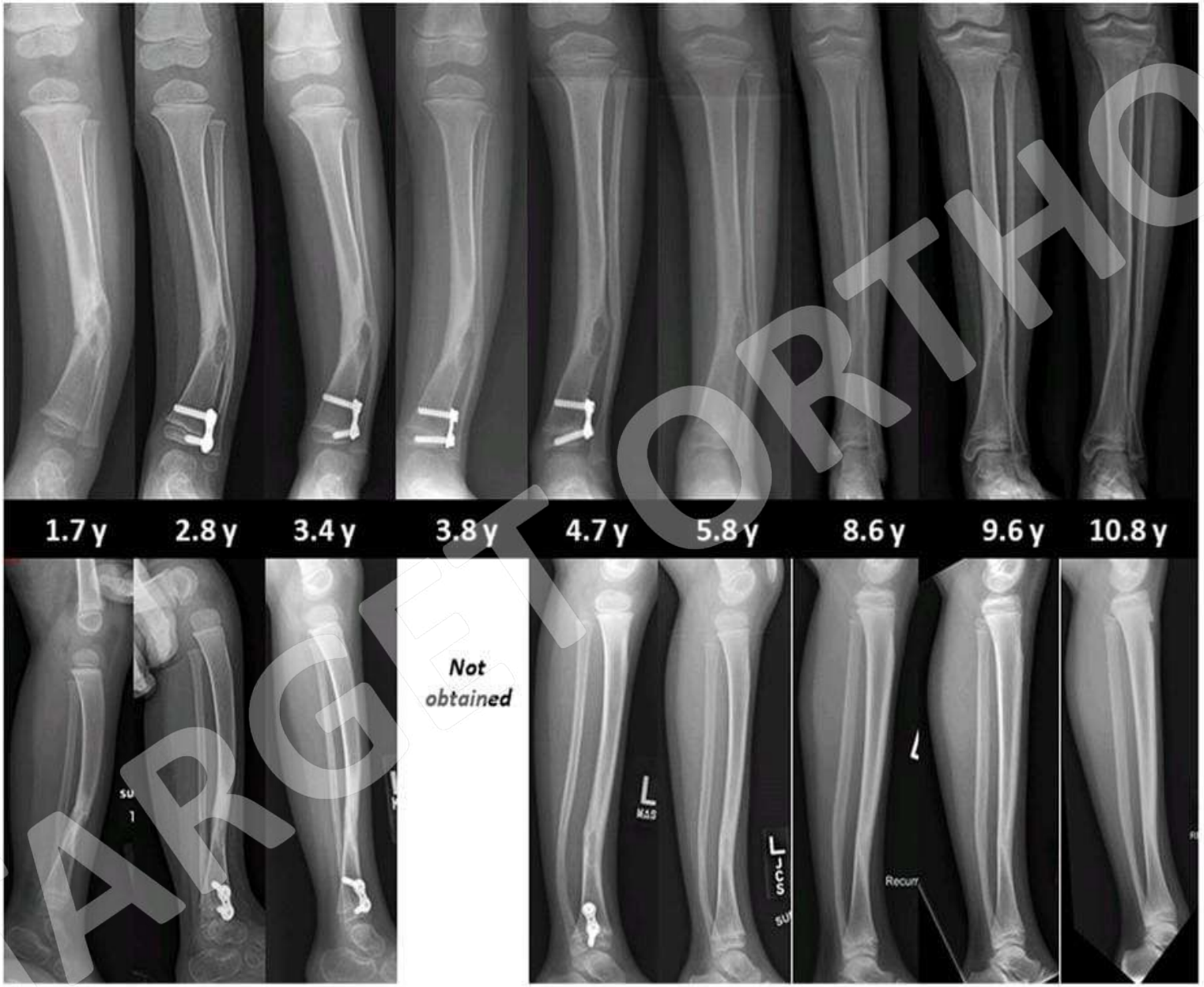
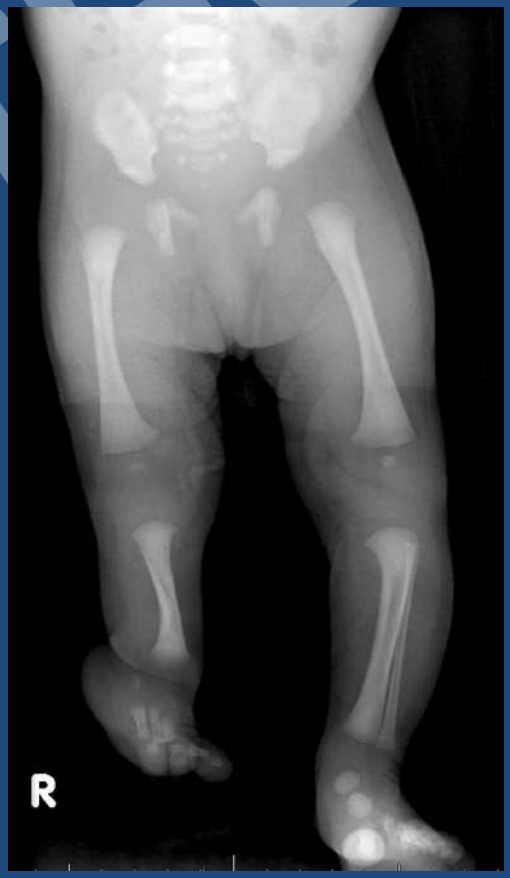


Fig. 2

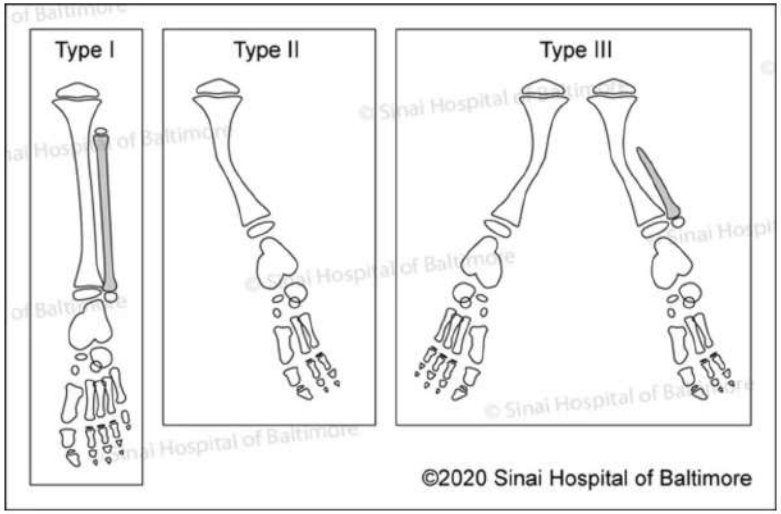
25.

Underlying diagnosis is?

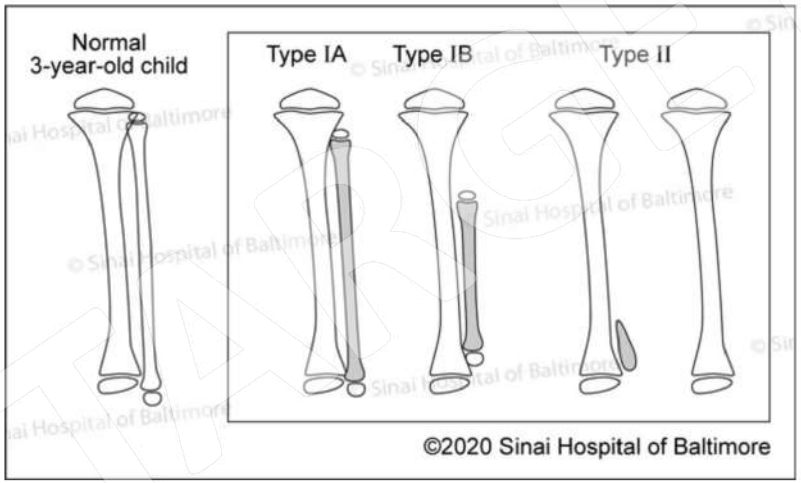
1. Tibial hemimelia
2. Fibular hemimelia
3. PFFD Complex
4. Phocomelia

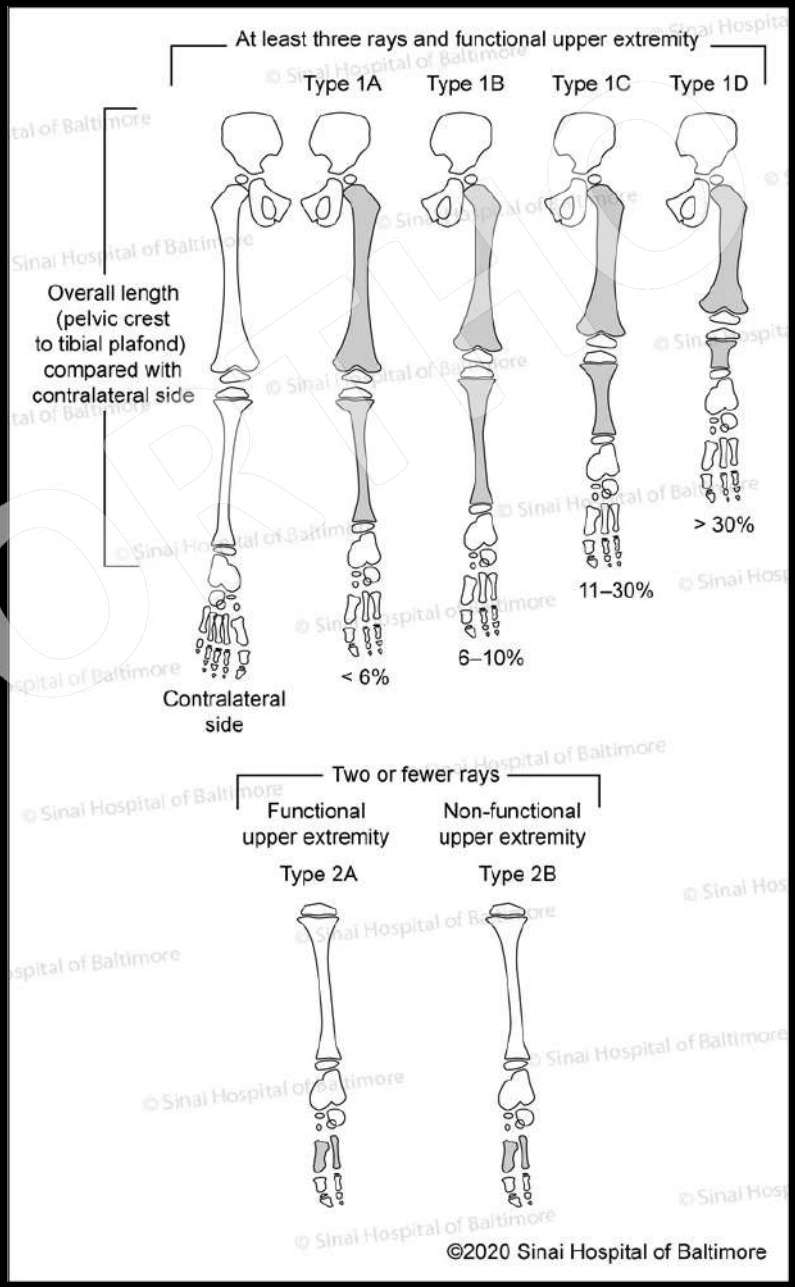


Coventry and Johnson Classification System



Achterman and Kalamchi Classification System





Answer 25.

2. Fibular Hemimelia