SELECTED MSK PEDIATRIC CASES

DR. HANA QUDSIEH

RADIOLOGY

MSK SYLLABUS

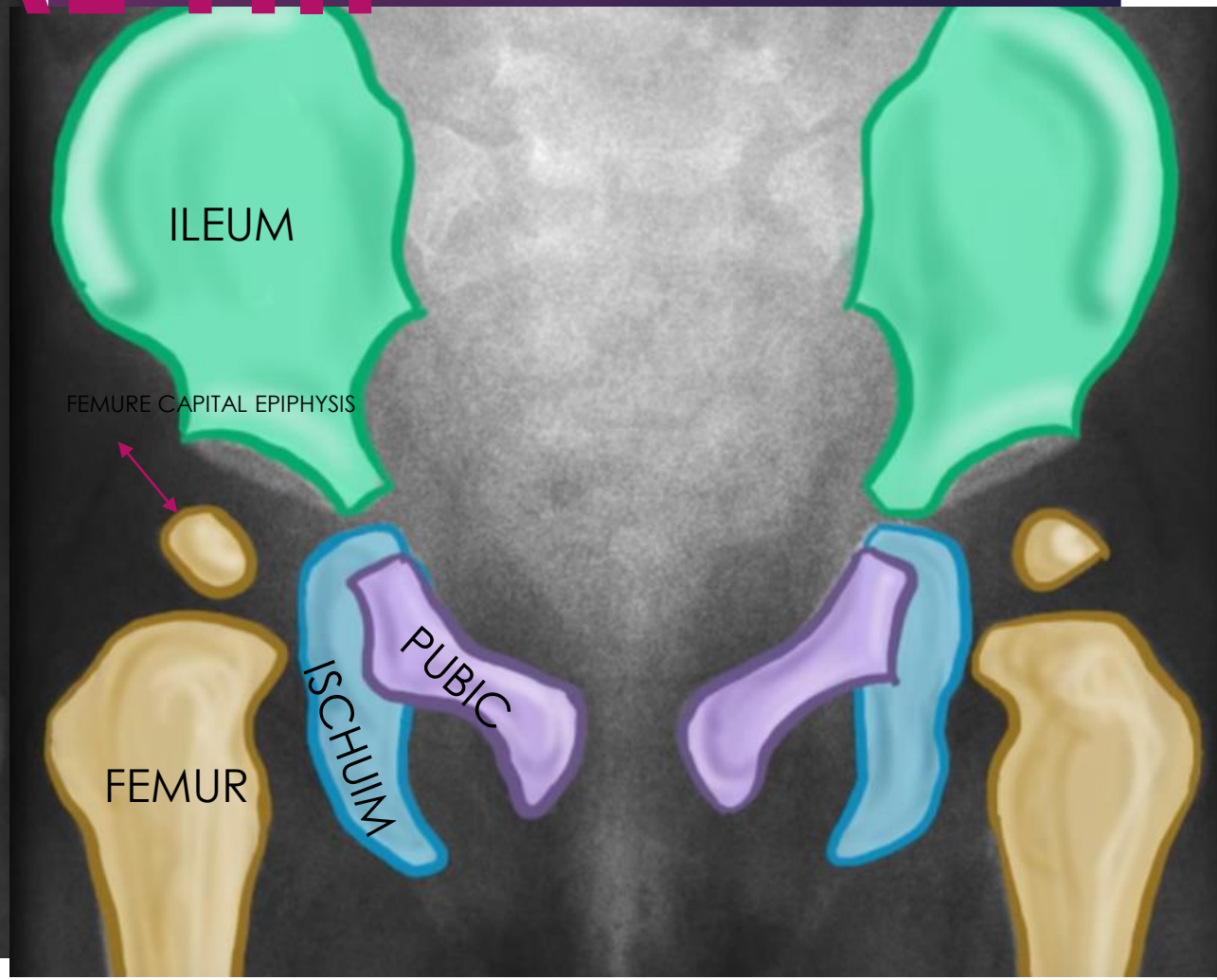
- DDH
- SLIPPED CAPITAL FEMORAL EPIPHYSIS.
- RICKET
- PERTHES DISEASE
- CHILD ABUSE

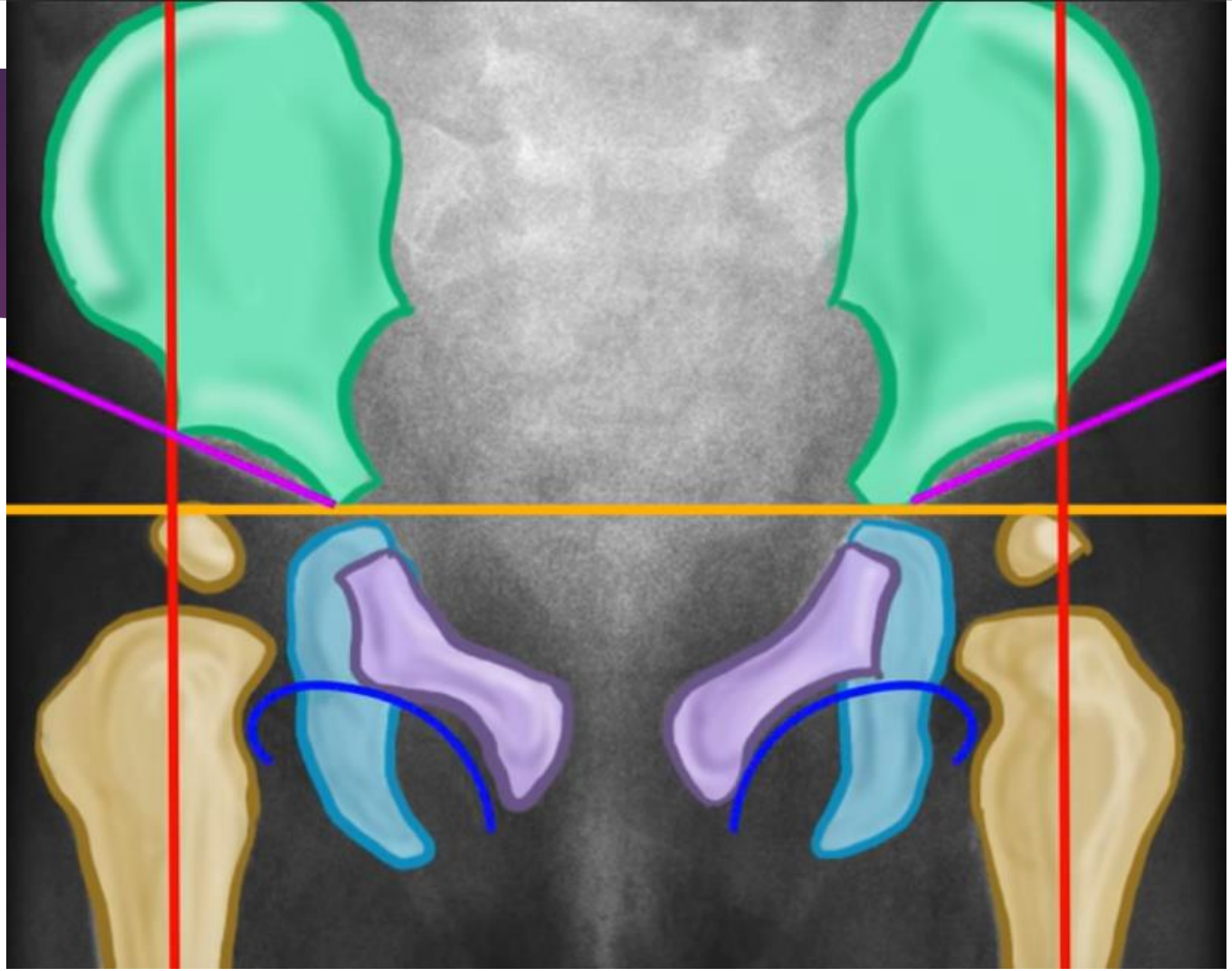
CASE #1

- ONE YEAR OLD GIRL WITH LOWER LIMB INSTABILITY .

(DELAY MOTORIC) WITH POSITIVE FAMILY HISTORY HER AUNT TO R/O DDH

NORMAL HIP



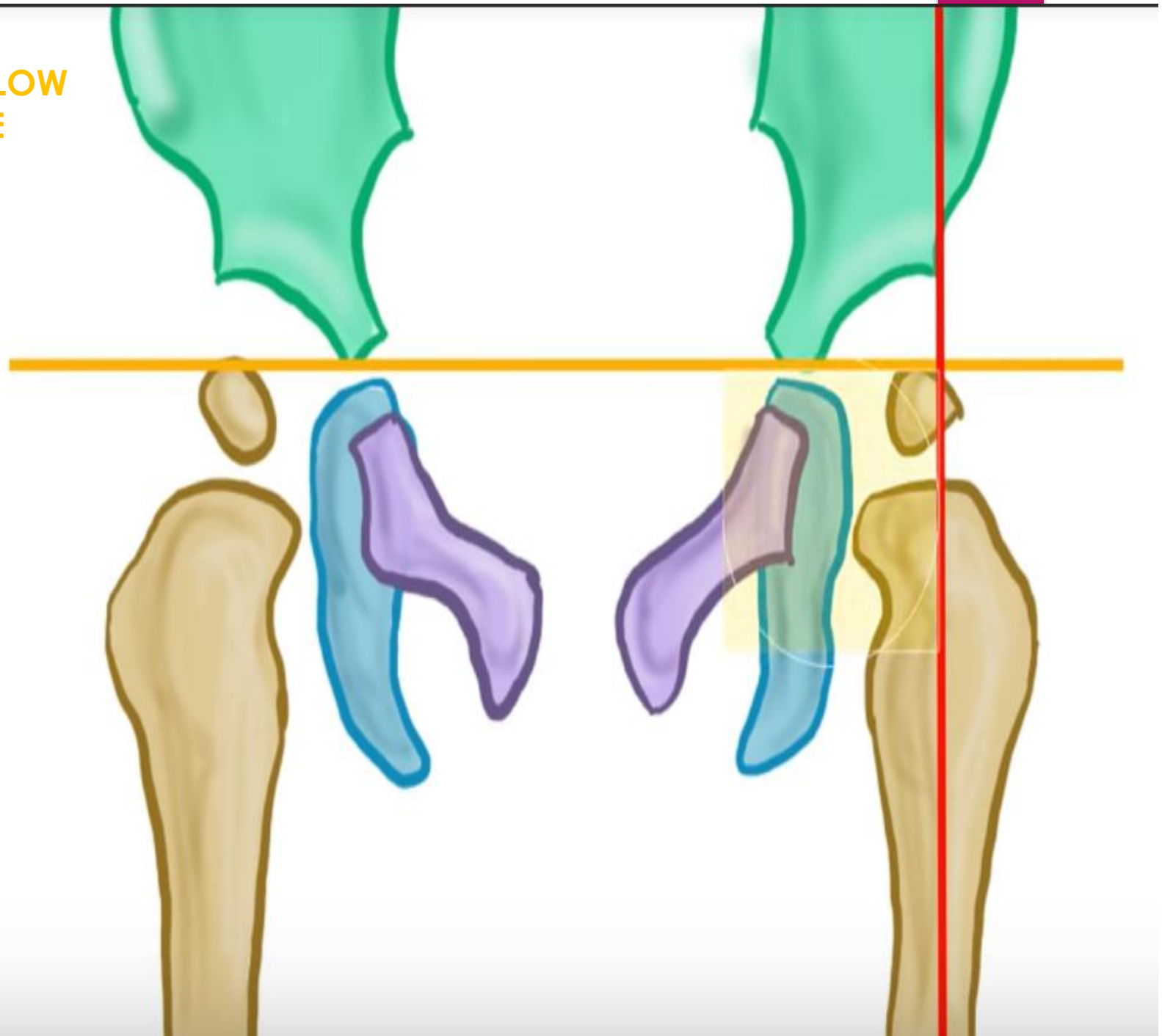


✦Hilgenreiner's line

YELLOW LINE

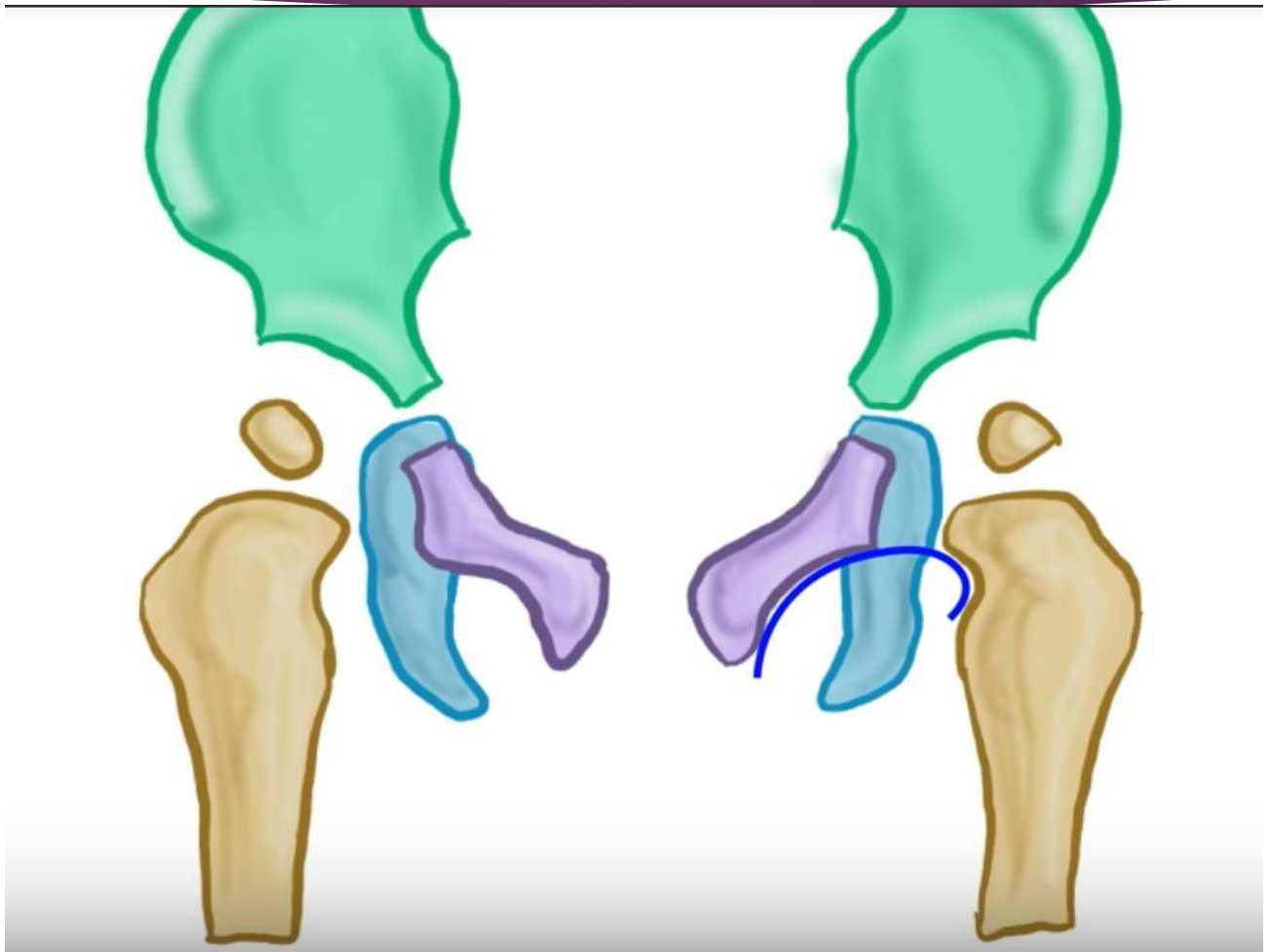
✦Perkin's line

RED LINE



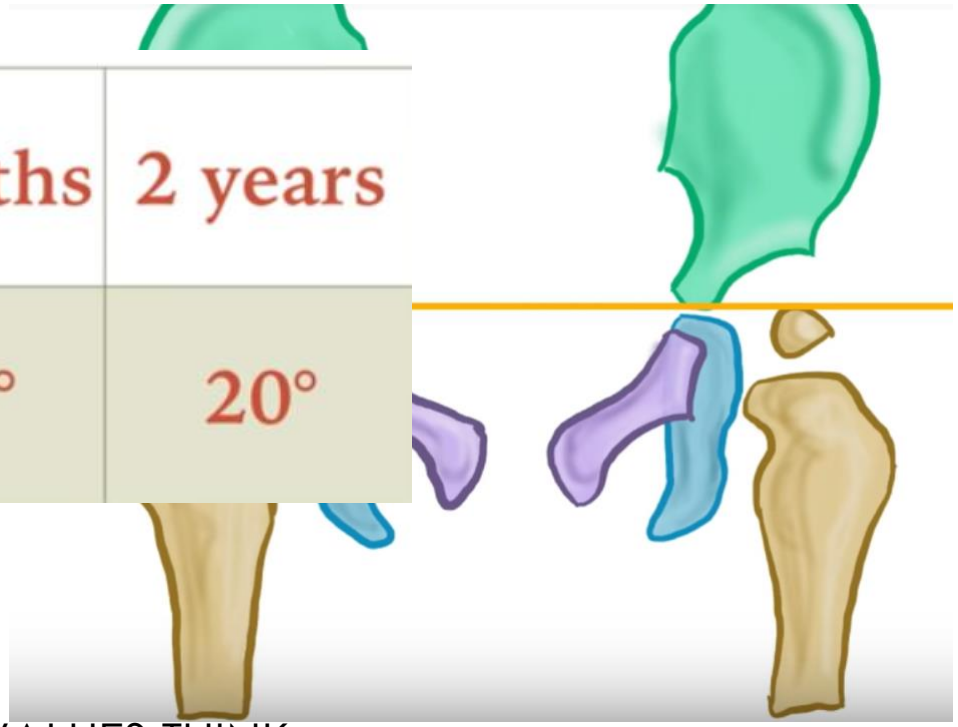
SHENTON'S LINE :

CONTINUOUS LINE FROM LESSER TROCHENTER TO LOWER PUBIC BONE (NORMALLY)



ACETABULAR INDEX (ANGEL)

Newborns	6 months	2 years
27.5° (mean)	23.5°	20°



IF IT IS MORE THAN THESE VALUES THINK ABOUT DDH

DEVELOPMENTAL DYSPLASIA OF HIP - DDH

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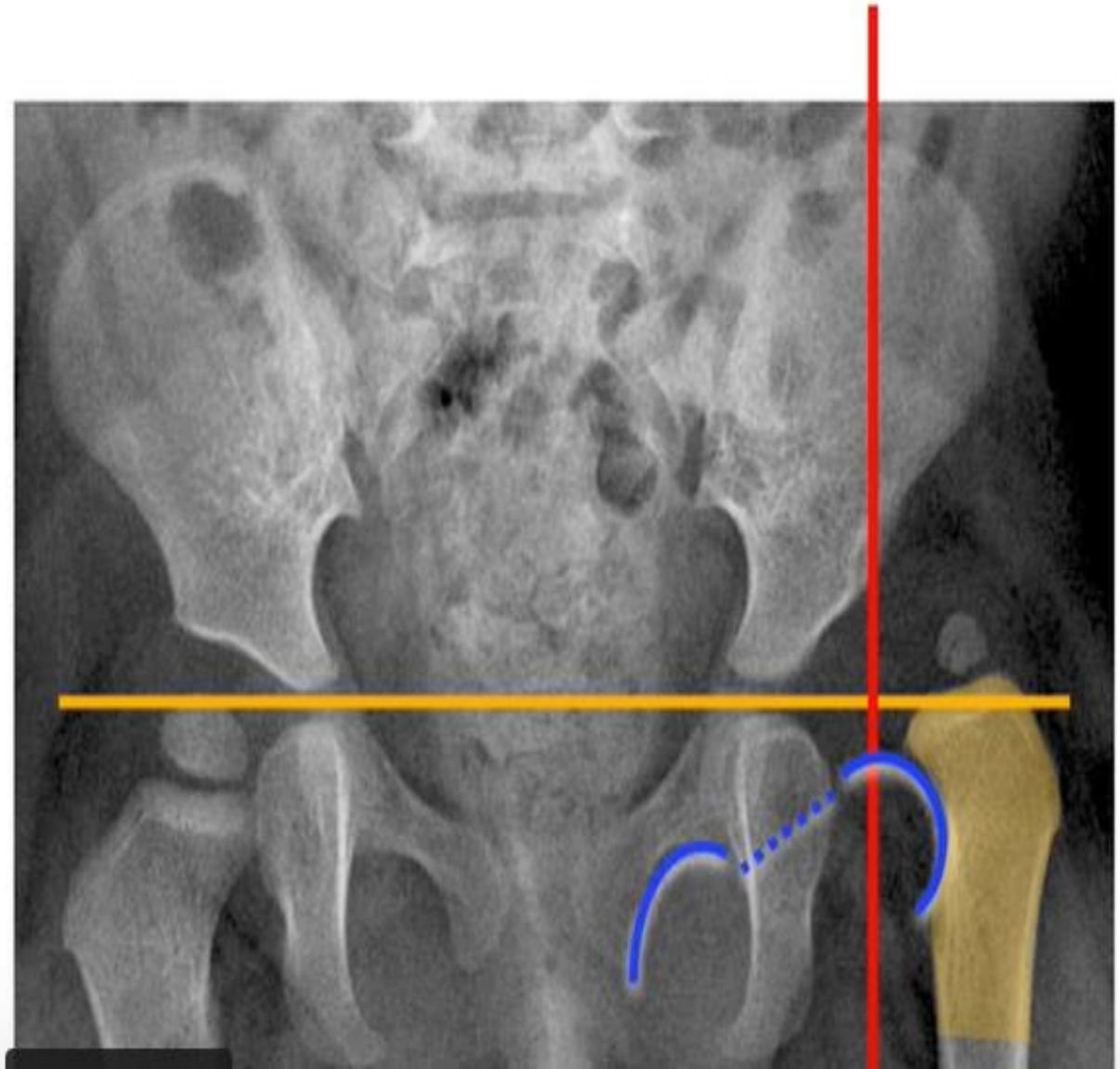
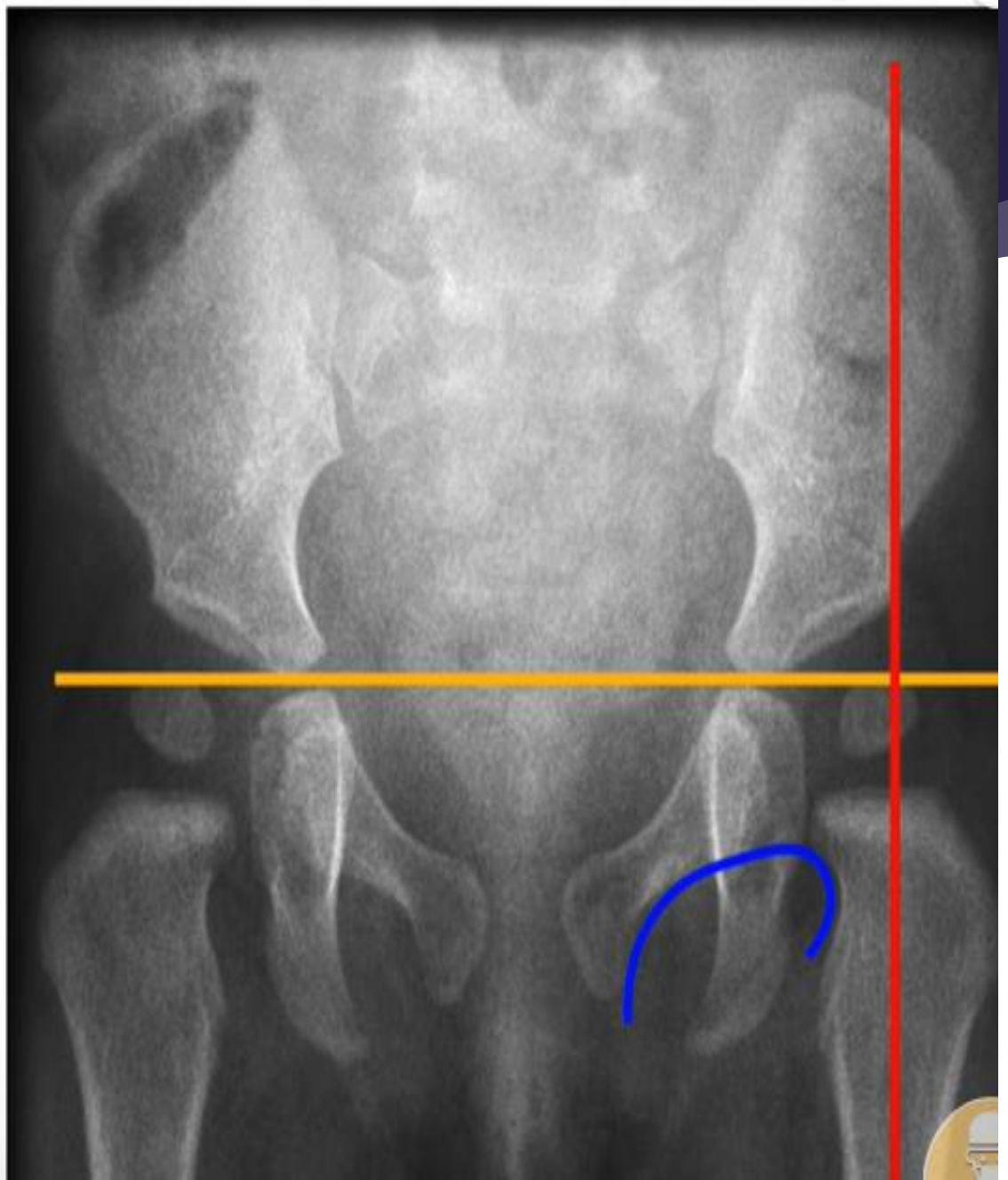
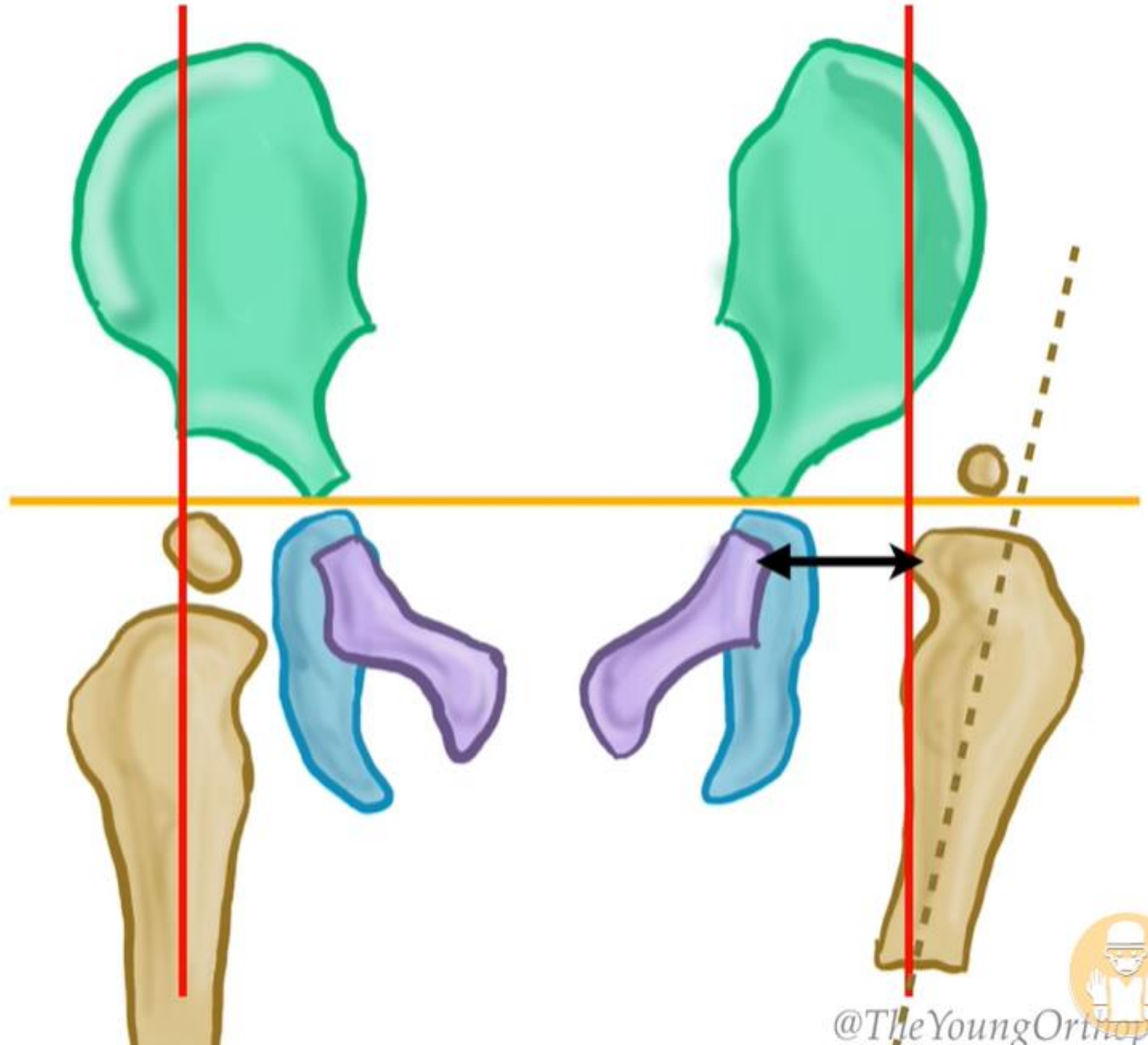




OTHER SIGNS

- Lateral displacement of femoral head
- Medial gap
- Capital epiphyseal dysplasia
- Pelvic (Ilium) hypoplasia
- Delayed fusion
- Adducted attitude



Developmental dysplasia of the hip (DDH),

- or in older texts **congenital dislocation of the hip (CDH)**, denotes aberrant development of the hip joint and results from an abnormal relationship of the femoral head to the acetabulum.
- Unlike CDH, developmental dysplasia of the hip is not confined to congenital malformations and includes perturbations in development [12]. There is a clear female predominance, and it usually occurs from ligamentous laxity and abnormal position in utero. Therefore, it is more common with oligohydramniotic pregnancies.

CASE #2

- ONE YEAR OLD BABY presented with failure to thrive, bowed legs and a thick wrist.


R

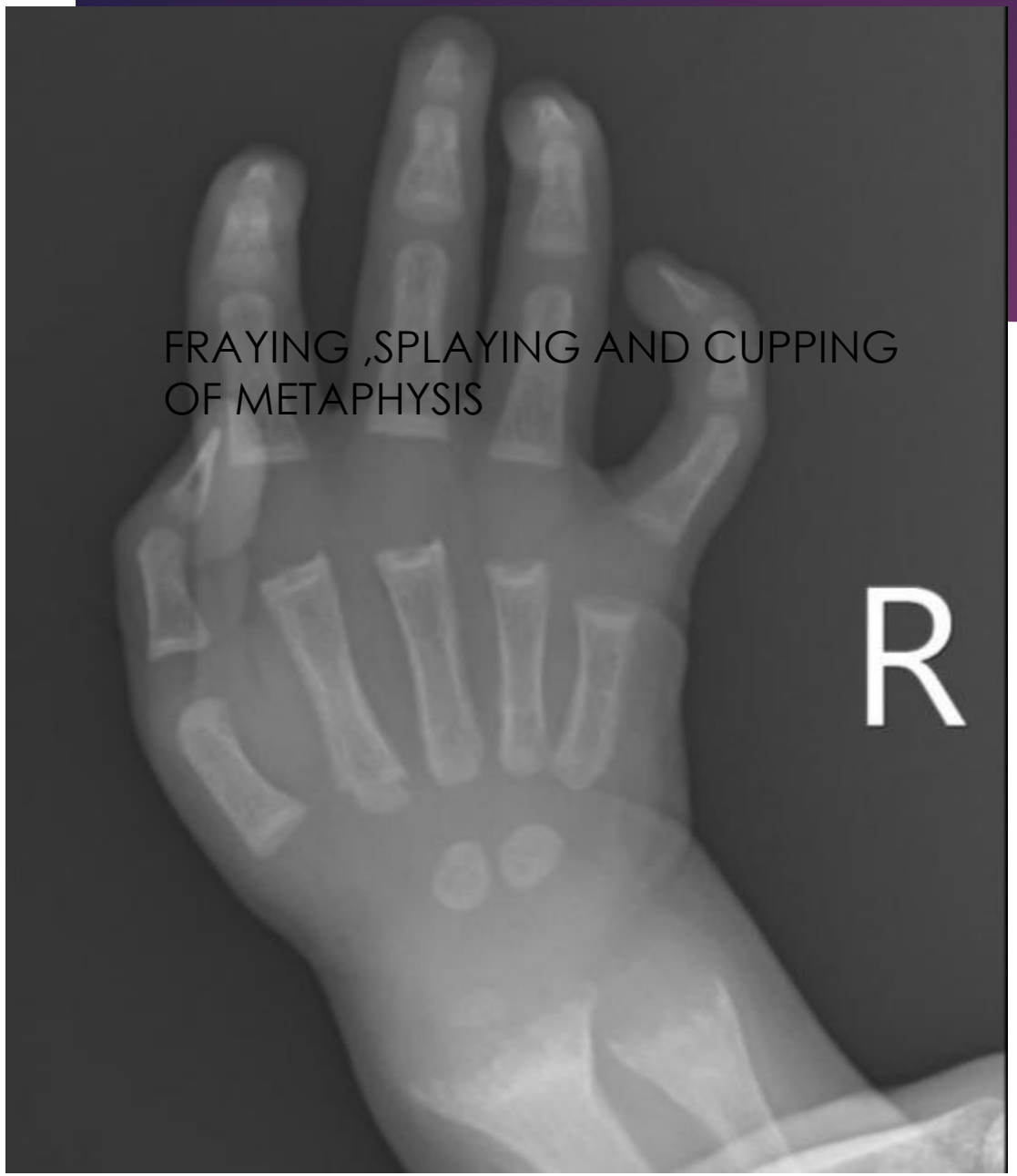
RADIOLOGICAL FINDINGS

- METAPHYSIS
- fraying: indistinct margins of the metaphysis
- splaying: widening of metaphysial ends
- cupping: concavity of metaphysis

EPIPHYSEAL

WIDENING

- RIBS RICHET ROSARY (BEEDED APPEARANCE ON POSTERIOR RIB)
- GENERAL BONE :
- DEMINERALISATION
- BOWING OF WEIGHT BEARING BONES.
- PROTRUSIO ACETABULI


FRAYING ,SPLAYING AND CUPPING OF METAPHYSIS
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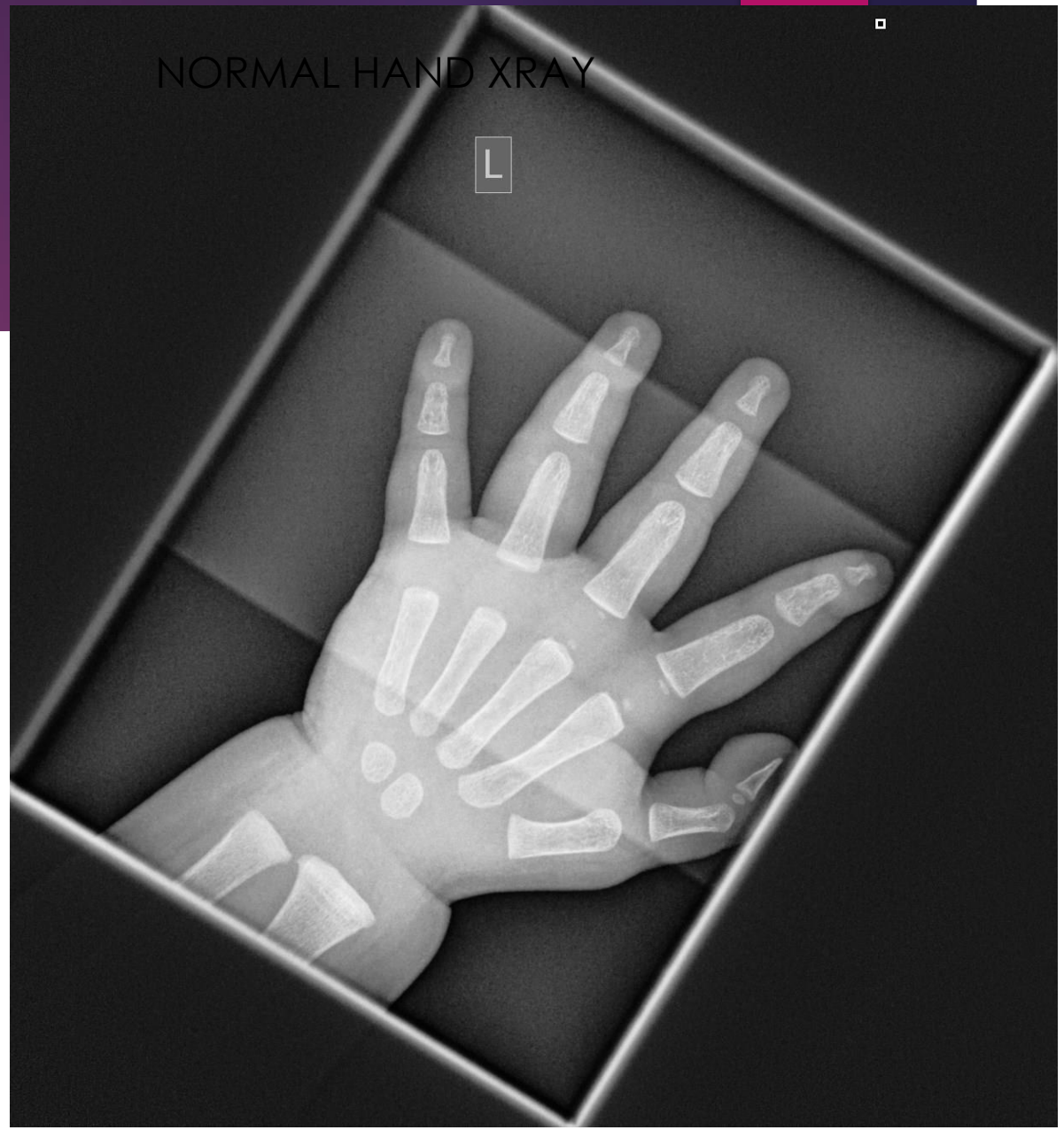
NORMAL HAND XRAY
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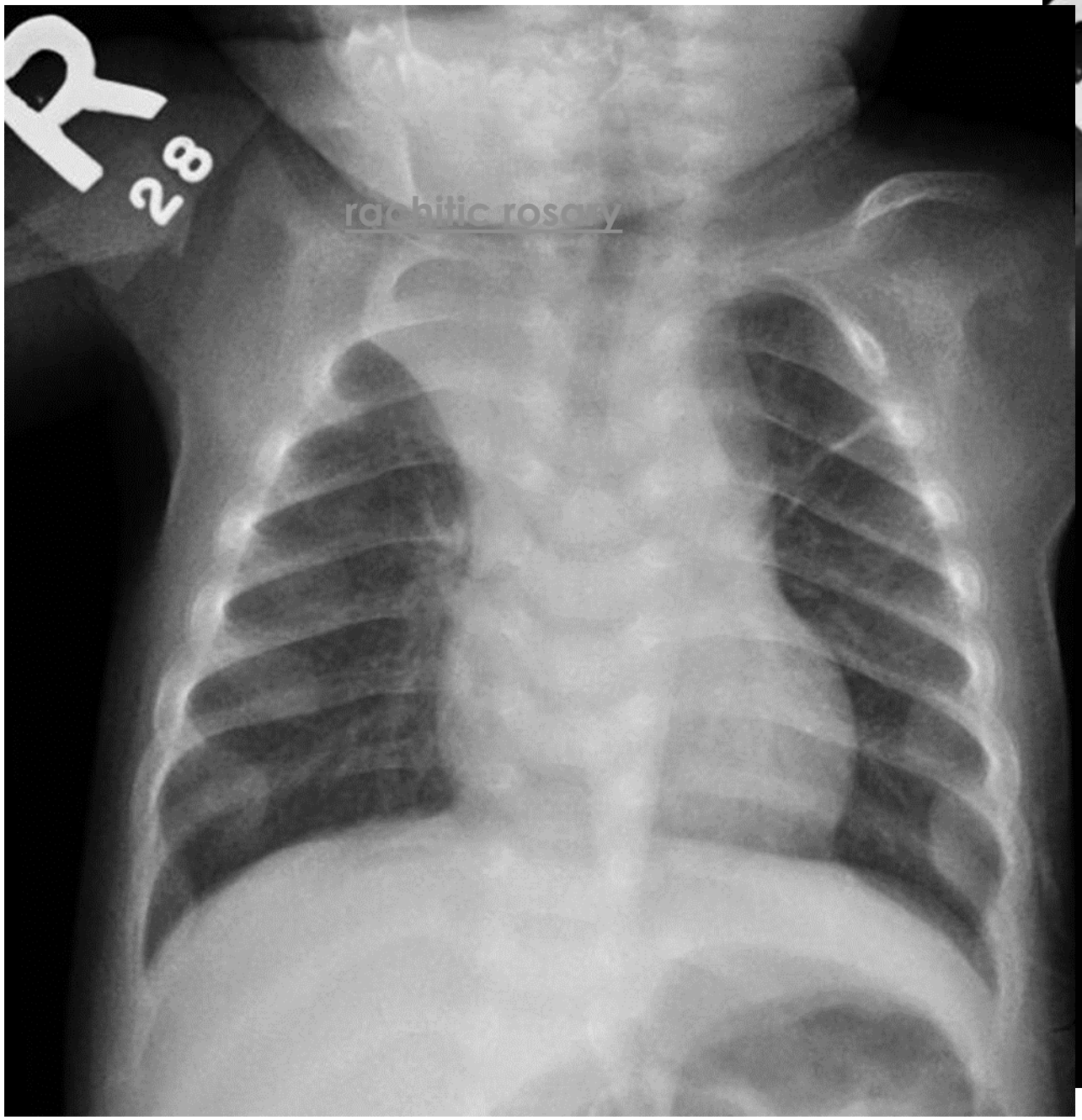
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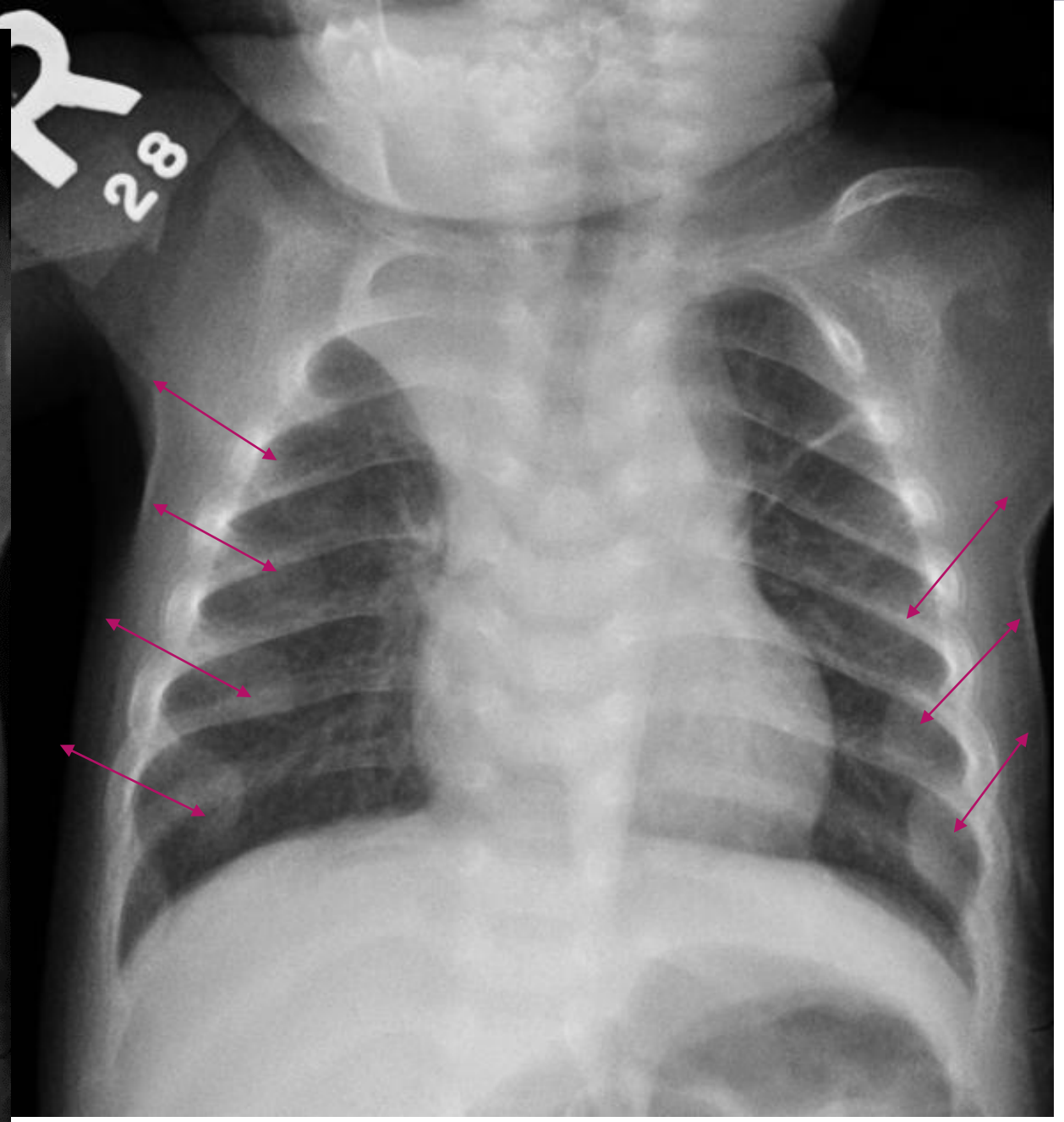
rachitic rosary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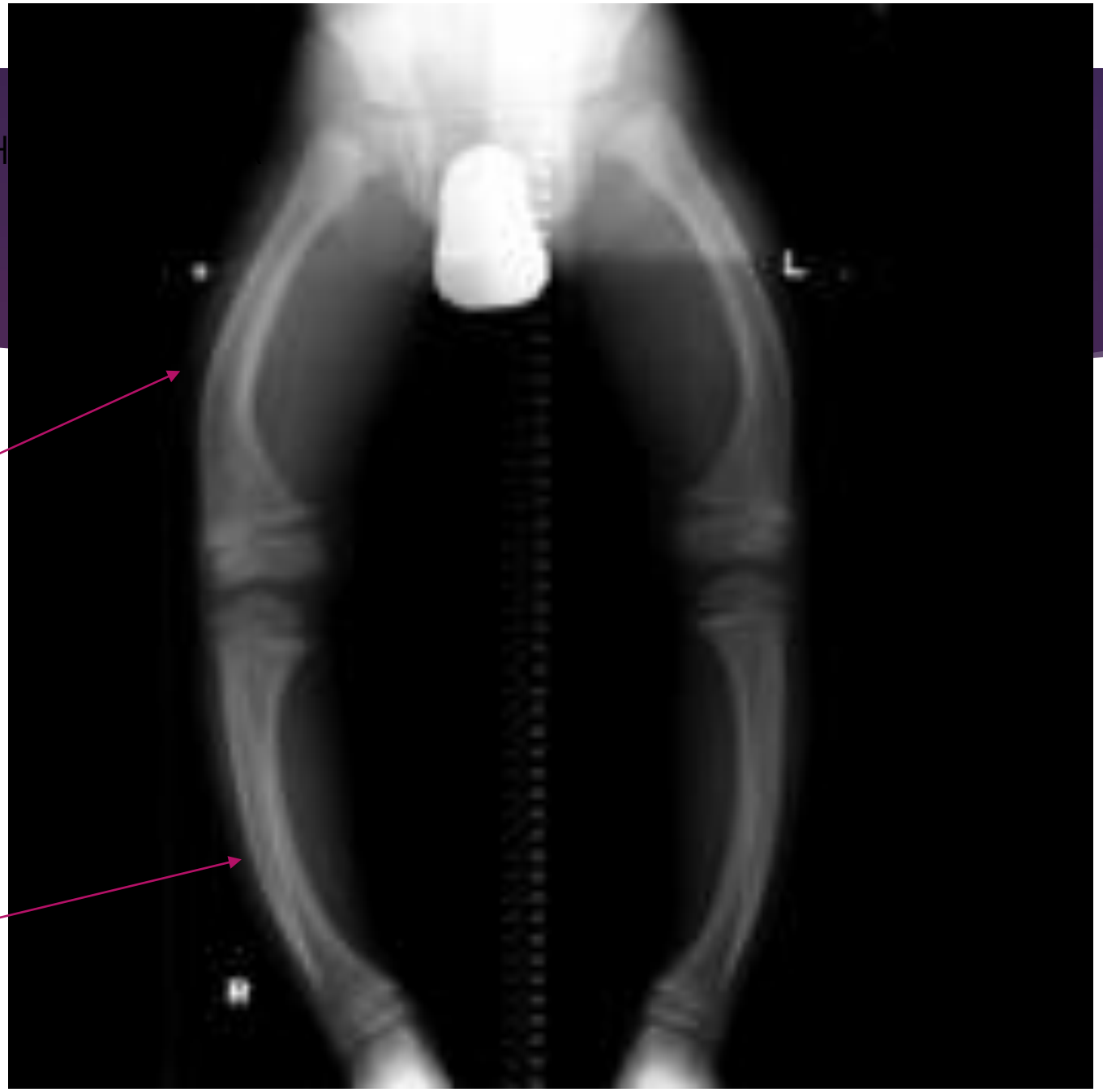
BOWING OF BOTH
AND FIBULA



bowing of the femurs, metaphyseal cupping and fraying,
coarsening of the trabecular pattern, increase in distance between end of shaft and epiphyseal center, poorly ossified epiphyseal centers.

- Protrusion of hip and spine into the soft pelvis with protrussio acetabuli

- CAUSES :
- vitamin D deficiency (most common cause) due to diet, insufficient sun exposure, and/or malabsorption
- dietary calcium deficiency
- defective vitamin D metabolism: :
- hereditary hypophosphatemic rickets (vitamin D resistant rickets)
- tumor-induced (oncogenic) rickets [6]
- Fanconi syndrome

RADIOLOGICAL FINDINGS

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- GENERAL BONE :
- DEMINERALISATION
- BOWING OF WEIGHT BEARING BONES.
- PROTRUSIO ACETABULI
- COARSE TRABECULATION.
- FRACTURE

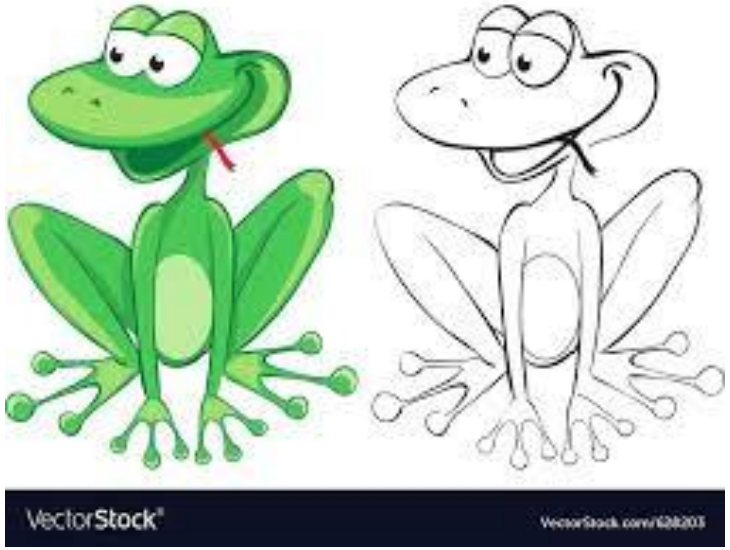
Case#3

- 4 year old BOY with painless limping then became painful on LT knee and hip

????? Mild reduction of epiphyseal height on left side

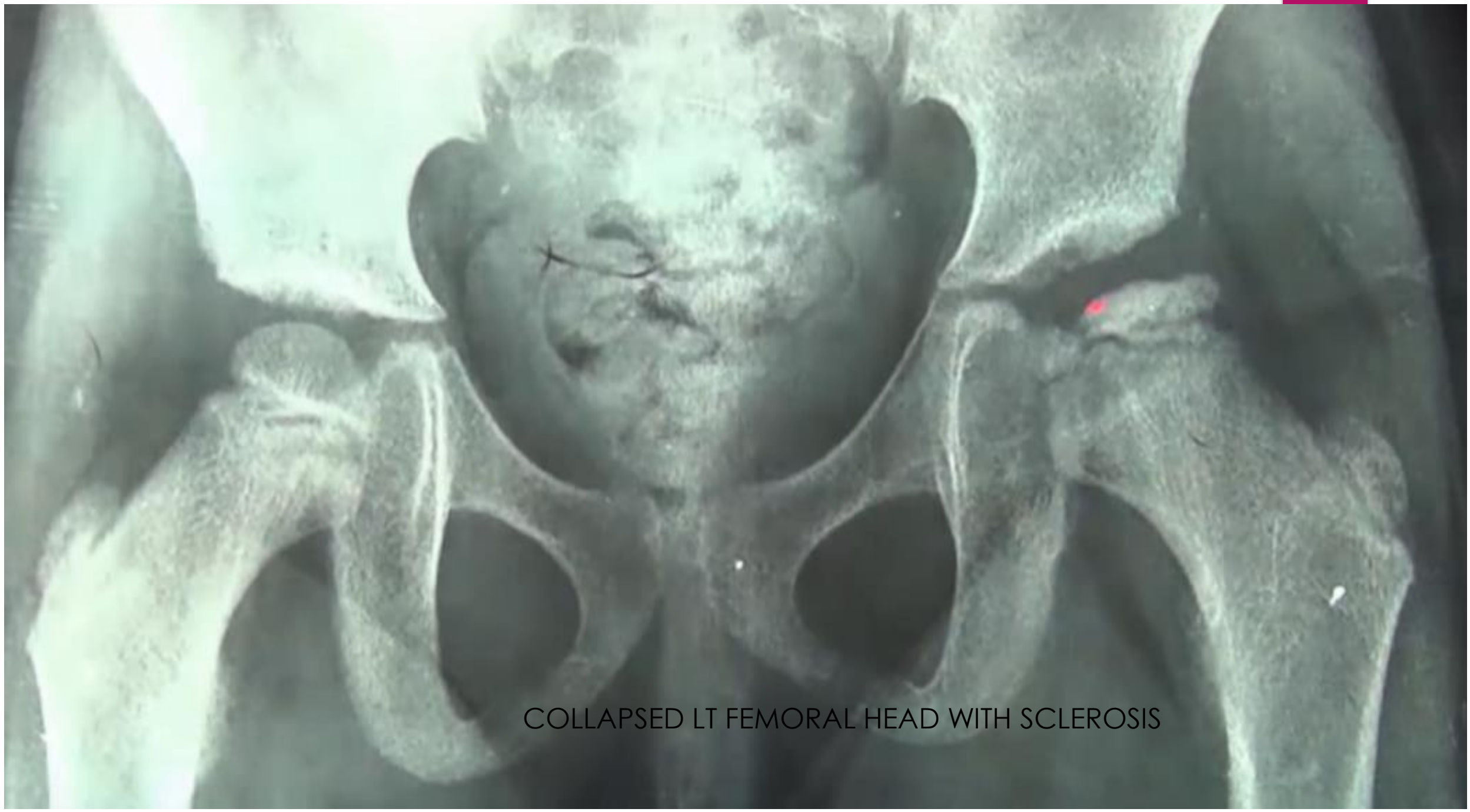
- NOT CONVENCING
- ASK FOR FROG HIP XRAY

- ALWYS ASK F[illegible] POSITION



LEFT SIDE: REDUCTION OF THE FEMORAL HEAD HEIGHT,WIDE EPIPHYSEAL PLATE ,SUBCHONDRAL LUCENCY (SUBCHONDRAL FRACTURE)

- 6 MONTH FOLLOW UP LATER……..



COLLAPSED LT FEMORAL HEAD WITH SCLEROSIS

Legg calve perthes

- Legg-Calve-Perthes disease is idiopathic avascular necrosis of the femoral head. It occurs most commonly in children between the ages of 5-8 who present with knee or hip pain or a limp. Boys are more commonly affected than girls (5:1). The disease is bilateral in approximately 15% of cases. A good prognostic indicator in Legg-Calve-Perthes disease is the age of onset because if it occurs by age six, then restoration of the spherical femoral head is likely and degenerative osteoarthrits can be avoided.

Four phases of Legg-Calve Perthes Disease

Waldenstrom stages:

- 1) Initial stage
- 2) Fragmentation stage
- 3) Re ossification stage
- 4) Healed stage

Initial Stage

Early radiographic signs:

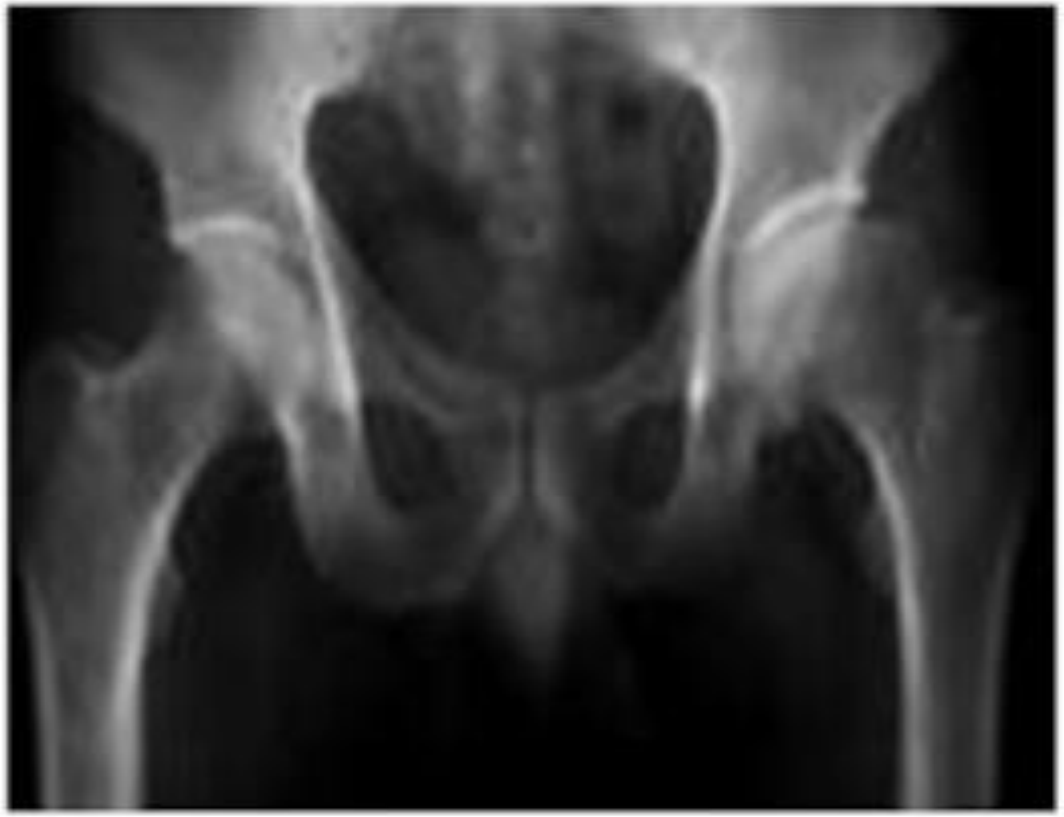
- Failure of femoral ossific nucleus to grow
- Widening of medial joint sp
- Irregular physeal plate
- Blurry/ radiolucent metaphysis

Fragmentation Stage

- Bony epiphysis begins to fragment
- Areas of increased lucency

Re ossification Stage

- Normal bone density returns
- Alterations in shape of femoral head and neck evident



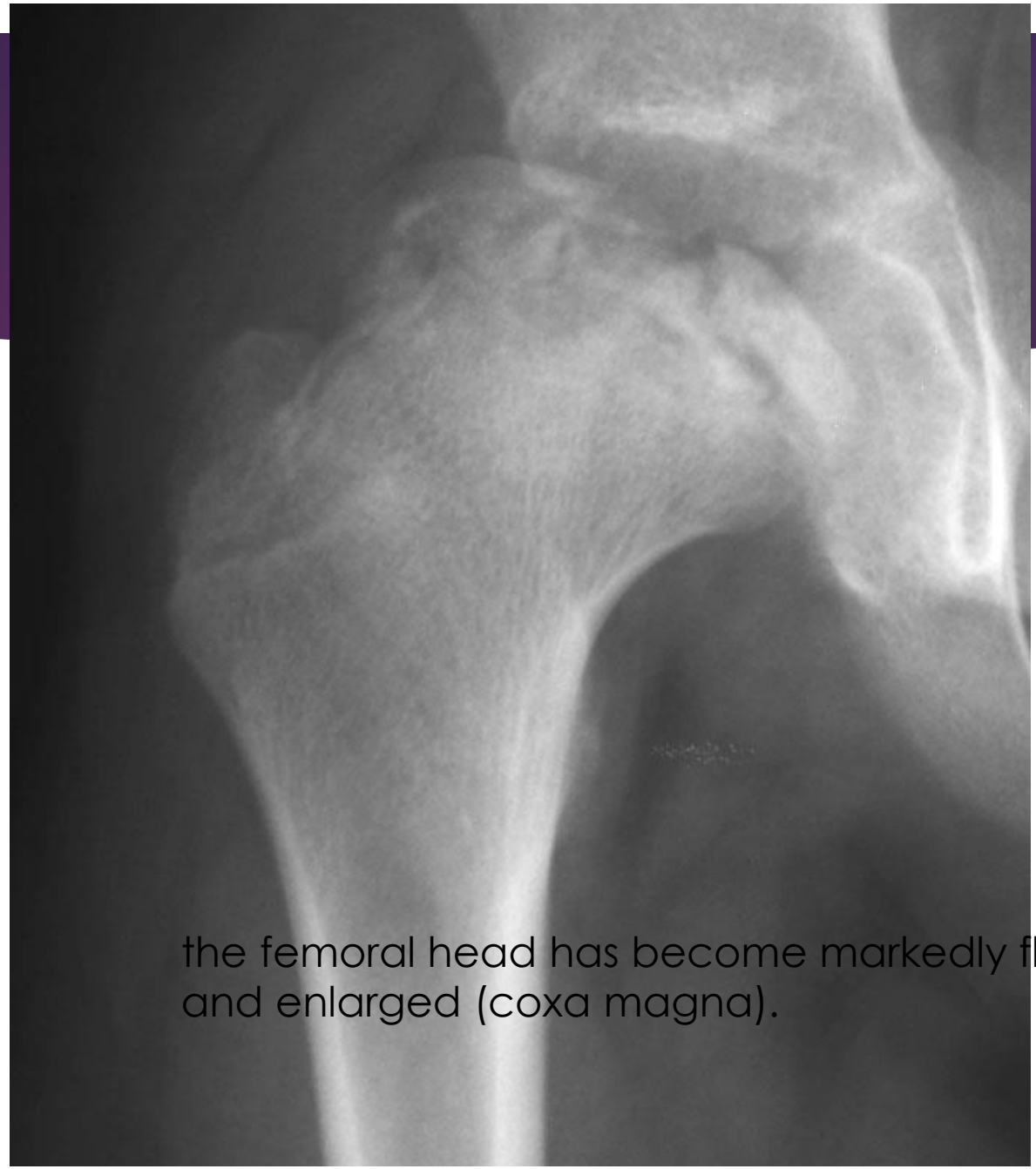
Healed Stage

- Left with residual deformity from disease and repair process

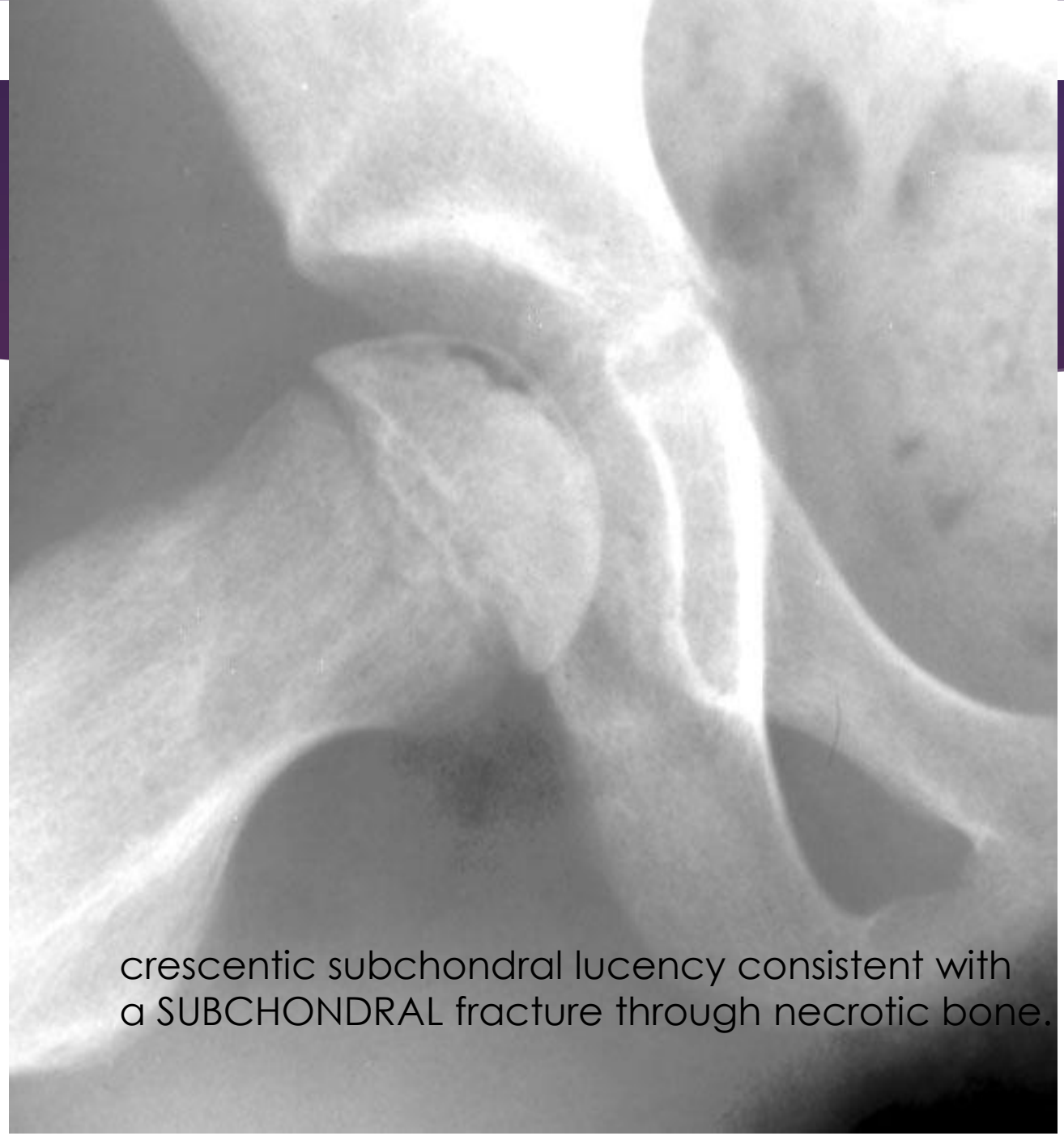
Catterall Criteria
Stage I — Histologic and clinical diagnosis without radiographic findings
Stage II — Sclerosis with or without cystic changes with preservation of the contour and surface of femoral head
Stage III — Loss of structural integrity of the femoral head
Stage IV — Loss of structural integrity of the acetabulum in addition

SIGNS OF CLPD

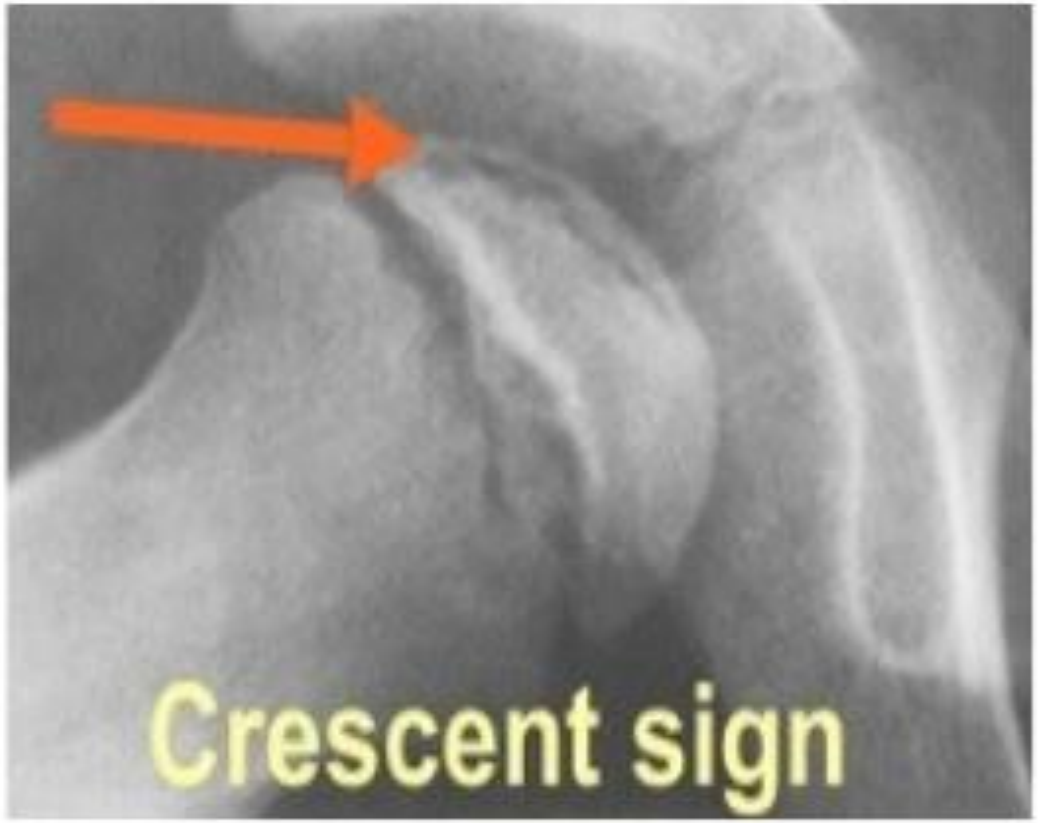
irregularity in contour of the right femoral head and widening of the right joint space as compared with normal findings on the left WITH FEMORAL HEAD REDUCTION

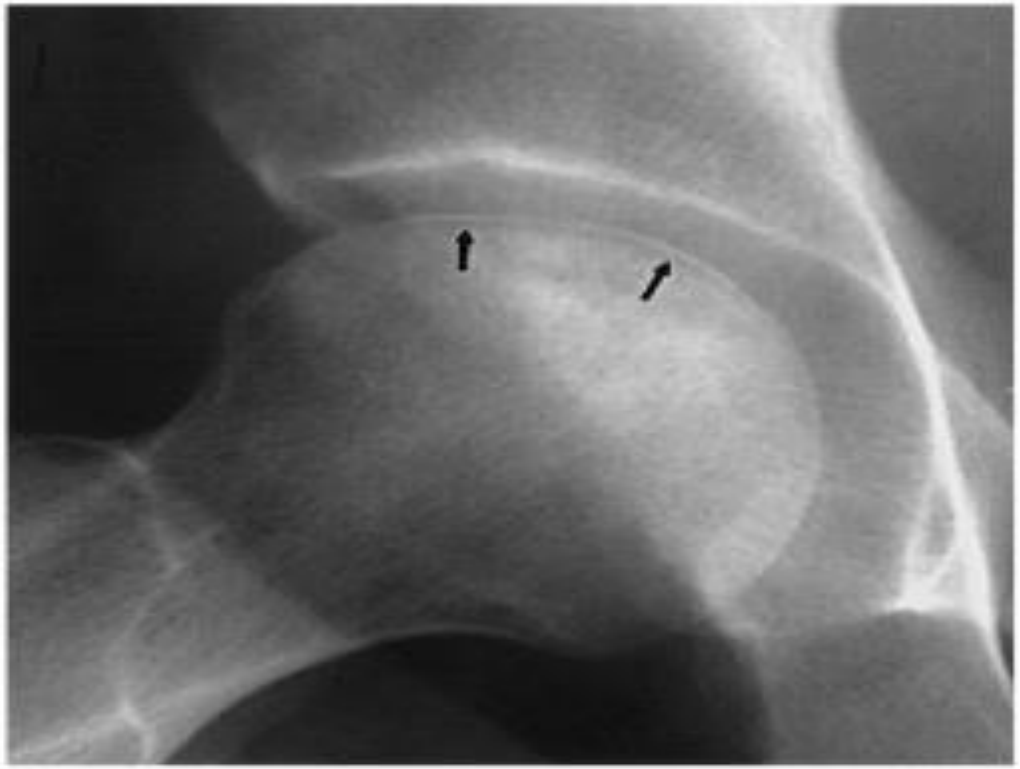


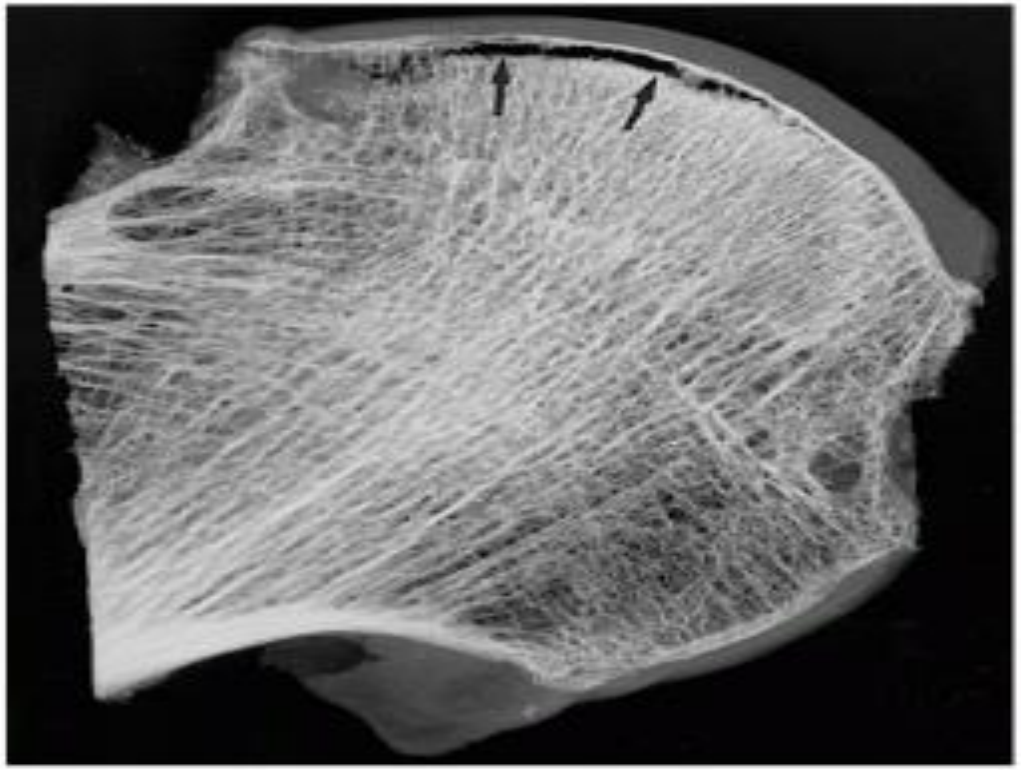
the femoral head has become markedly flattened (coxa plana) and enlarged (coxa magna).



crescentic subchondral lucency consistent with a SUBCHONDRAL fracture through necrotic bone.


Crescent sign





COXA PLANA : COLLAPSED BOTH FEMORAL HEAD EPIPHYSIS

CASE #4

ONE YEAR OLD MALE PRESENTED WITH DOWNFALL FROM THE COUCH

SPIRAL FRACTURE OF THE FEMUR
Diaphyseal fractures are non-specific as they do occur in both accidental and non-accidental injury.
However in these cases the age of the child and the history become very important.

- SPIRAL FRACTURE OF THE FEMURE FROM FALLING DOWN FROM A COUCH
- ??????????????????????????????

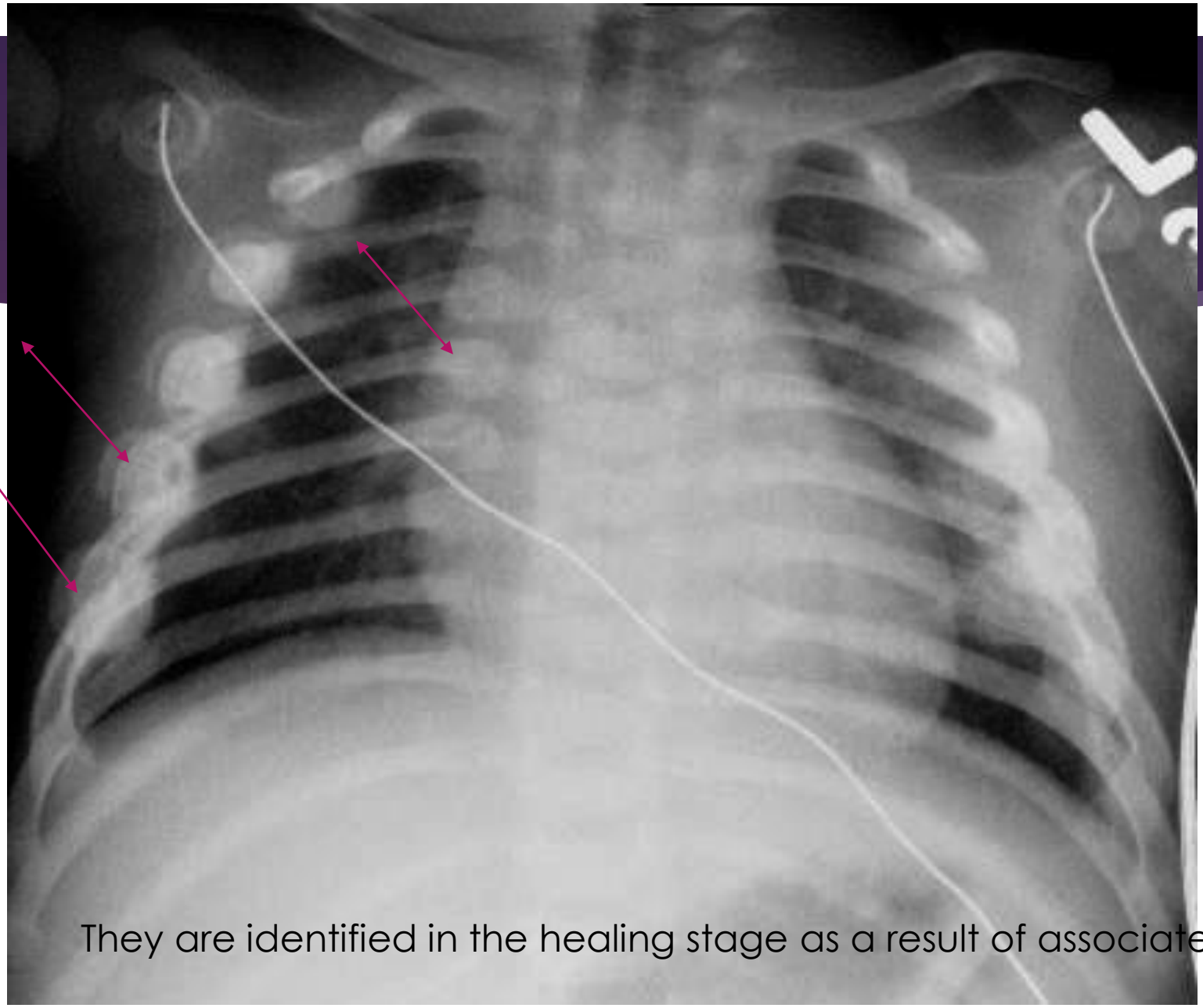
- SKELETAL SURVEY WAS REQUESTED TO R/O NON ACCIDENTAL TRAUMA (CHILD ABUSE)

- A skeletal survey consists of :
- two views of the skull
- lateral thoracic and lumbar spine
- AP views of both upper and both lower extremities
- AP views of both hands and both feet
- AP view of the Pelvis
- *may* require CT scan of head
- *may* require repeat skeletal survey in two weeks to look for healing injuries not seen on initial survey

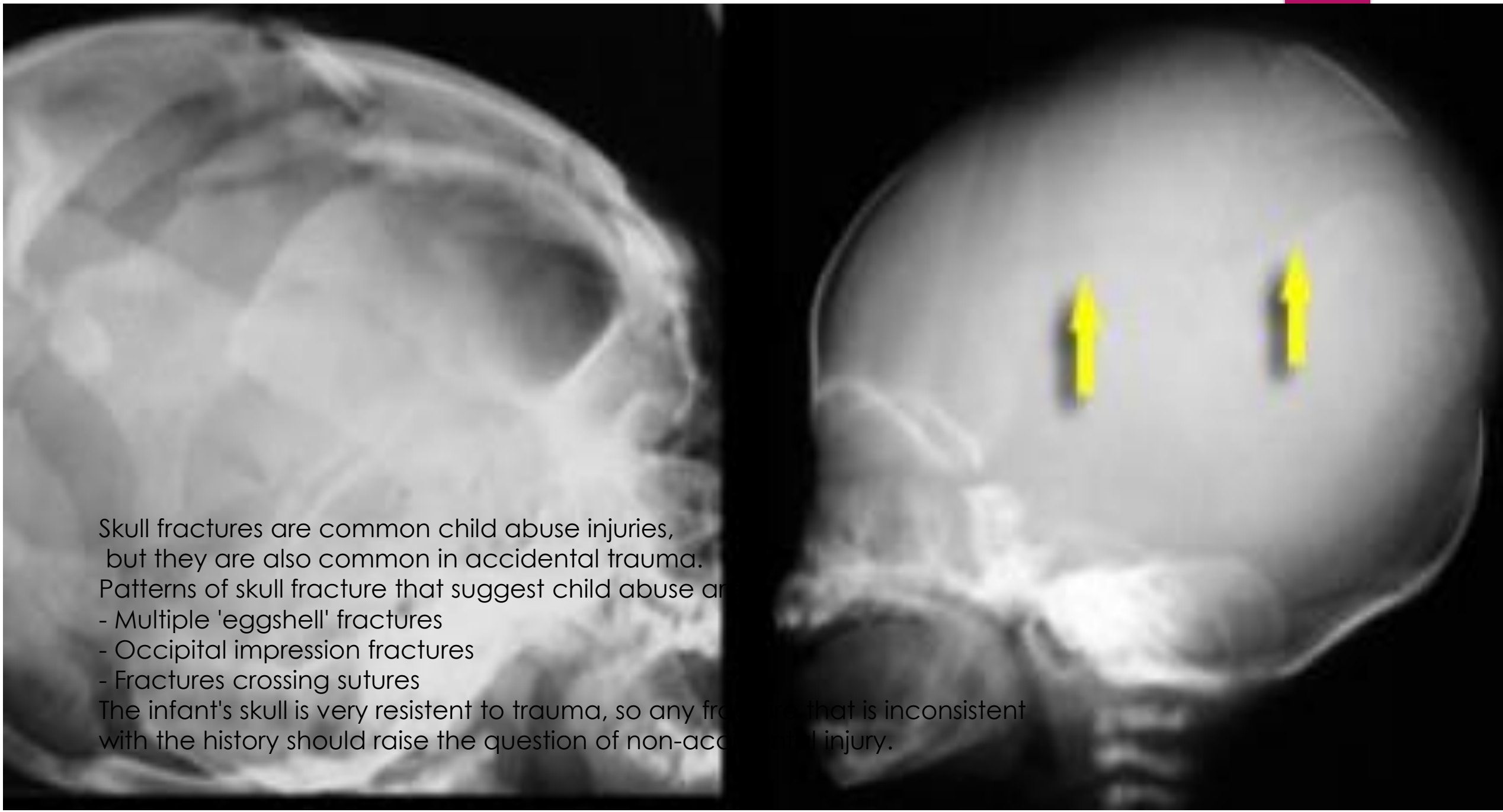
CORNER FRACTURE a small piece of bone is avulsed due to shearing forces on the fragile growth plate it is seen as the typical corner fracture.

Bucket handle fract

These fract



They are identified in the healing stage as a result of associated callus.

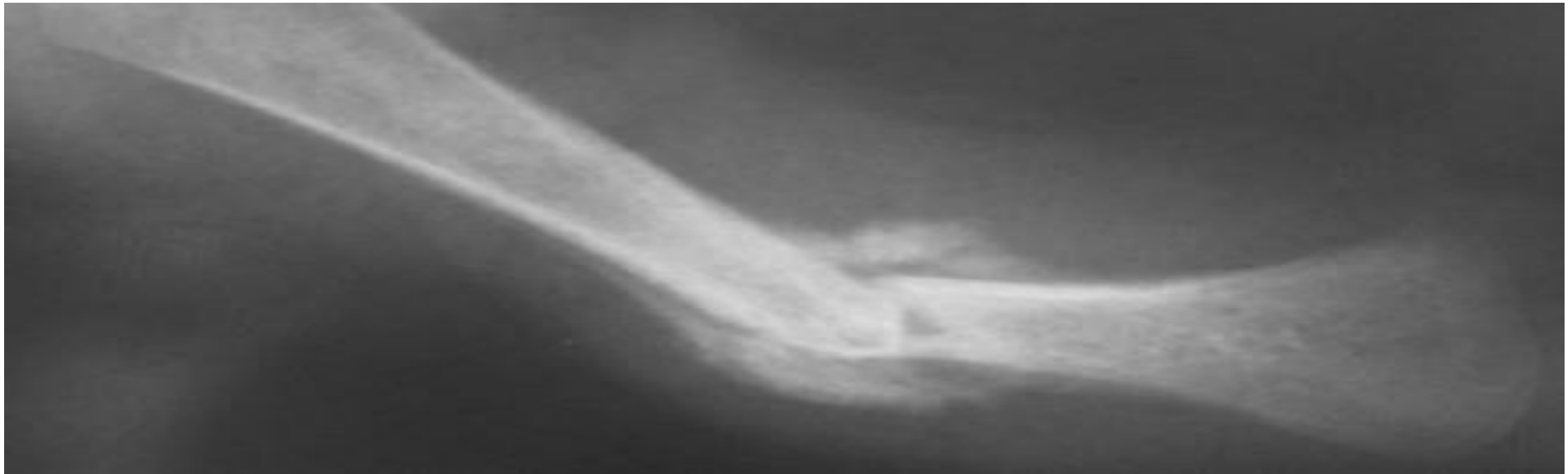


Skull fractures are common child abuse injuries,
but they are also common in accidental trauma.
Patterns of skull fracture that suggest child abuse ar
- Multiple 'eggshell' fractures
- Occipital impression fractures
- Fractures crossing sutures
The infant's skull is very resistent to trauma, so any fr hat is inconsistent
with the history should raise the question of non-acc l injury.

Callus in diaphyseal fractures generally forms no earlier than 5 days after a fracture, but will usually form by 14 days. Thus, fractures without visible callus may be up to 14 days old, and fractures which demonstrate a little bit of callus are at least 5 days old. Large amounts of callus indicate at least 2 weeks old.

These signs can be used to correlate with the history. For instance a child that fell out of bed the day before cannot have a fracture with callus formation.

Metaphyseal fractures do not typically heal with callus as there is no periosteal disruption, so dating of mETaphyseal fractures is difficult.



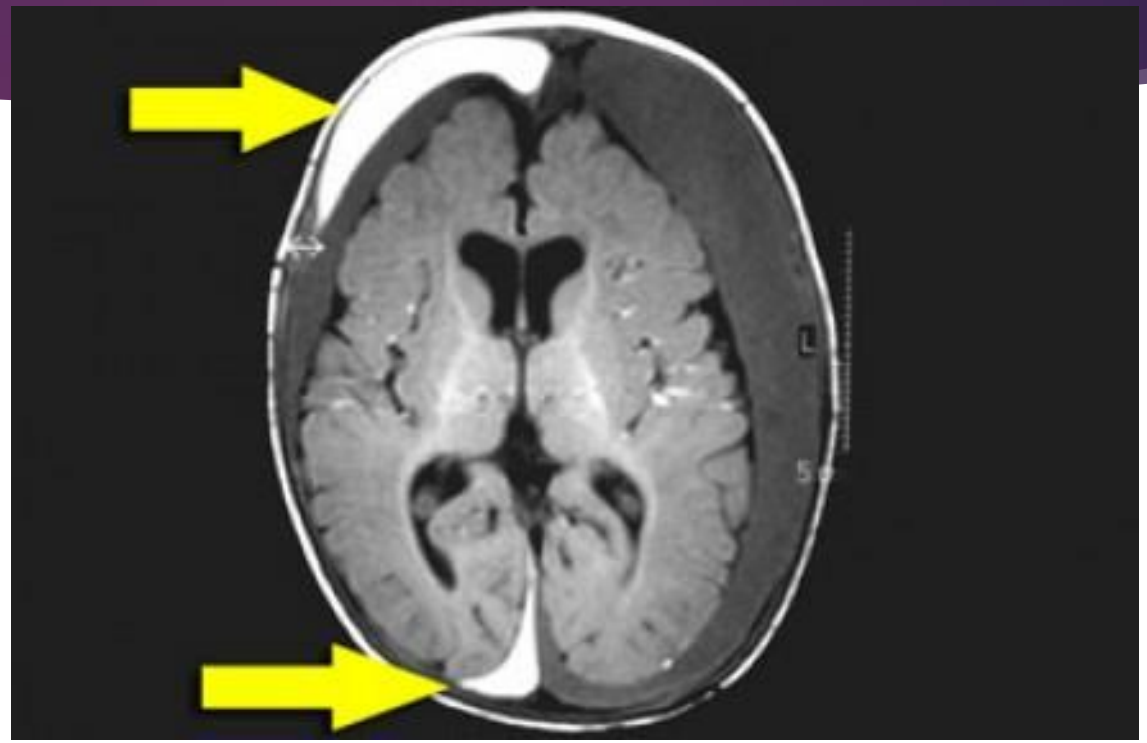
non-accidental trauma

- Child abuse, or non-accidental trauma, is an all-too-common entity. Estimates have suggested that over one million children (most under one year of age) are seriously injured and up to 5000 children killed each year in the United States secondary to physical abuse. When suspicions of potential abuse are raised due to either clinical or radiographic findings, a skeletal survey must be obtained.

Fractures *High Specificity for Child Abuse*

Bucket handle or Corner fractures
Ribs (especially posterior)
Acromion
Spinous processes
Sternum
Occipital impression fractures

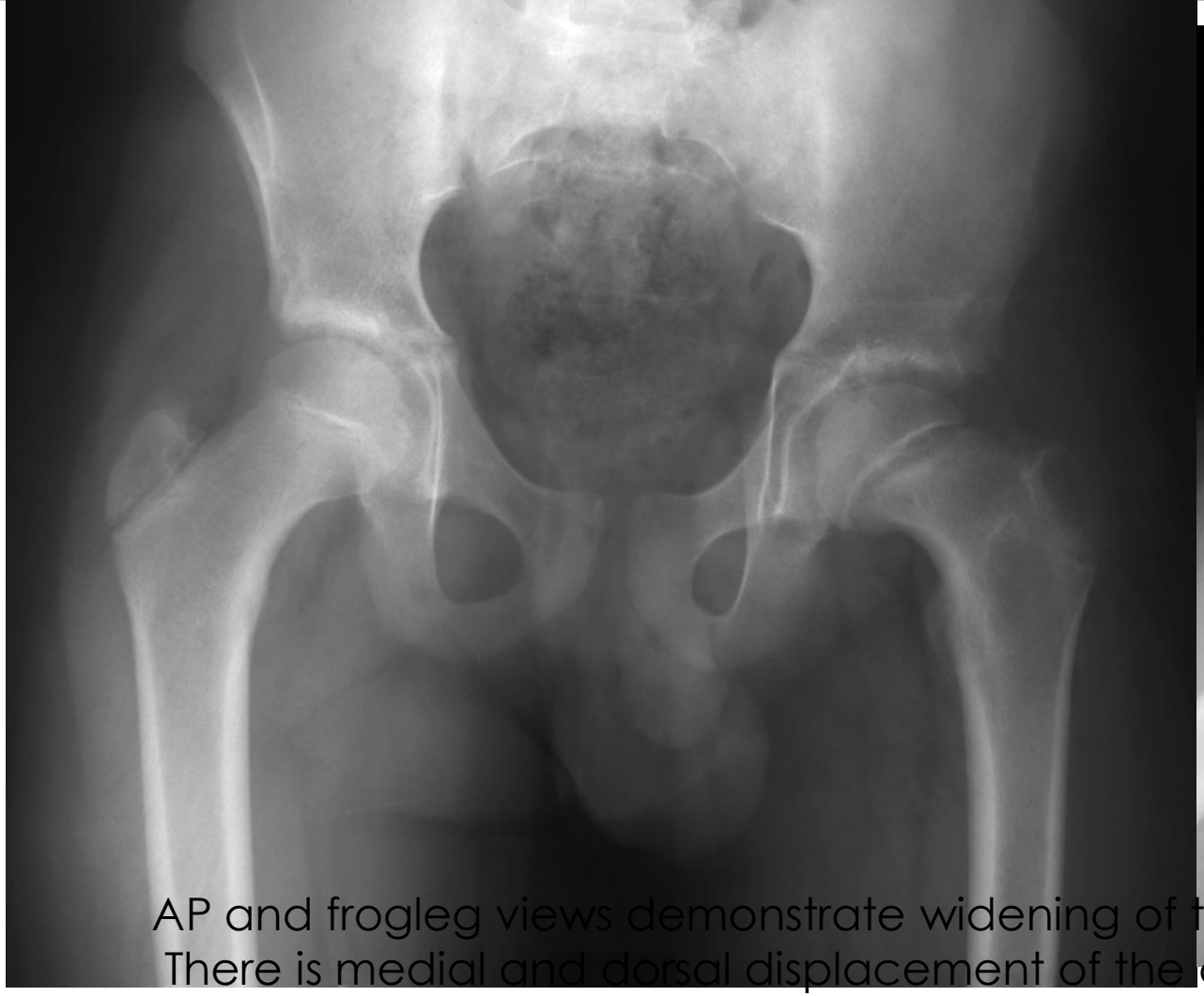
OTHER FINDINGS

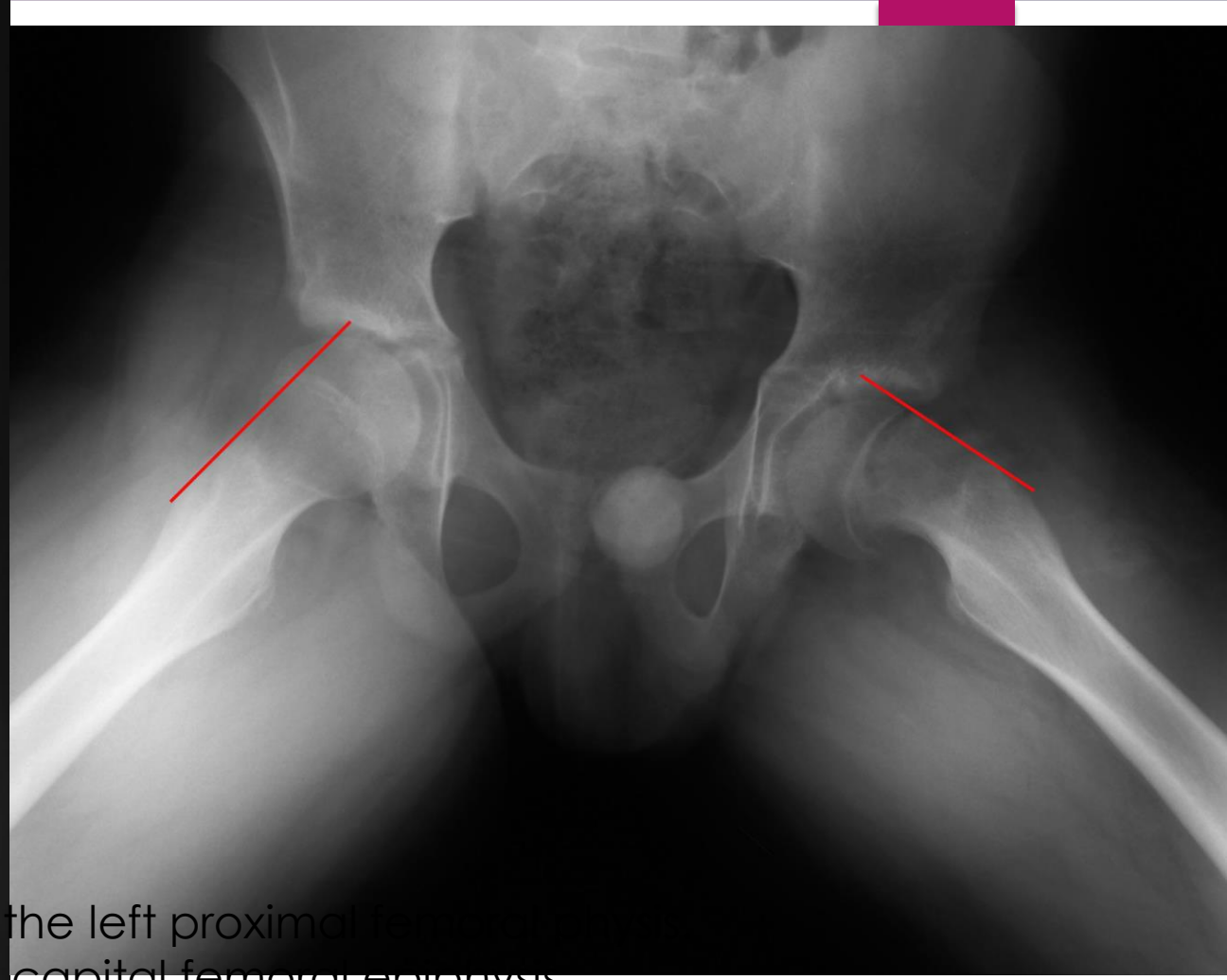


T1WI shows bilateral fluid collections as a result of chronic bilateral subdural hematomas and
new subdural hematomas in the right frontal and posterior interhemispheric region(BILATERAL SUBDURAL HEMATOMA WITH DIFFERENT AGES)

CASE#5

- 13 Y OLD BOY LT HIP PAIN





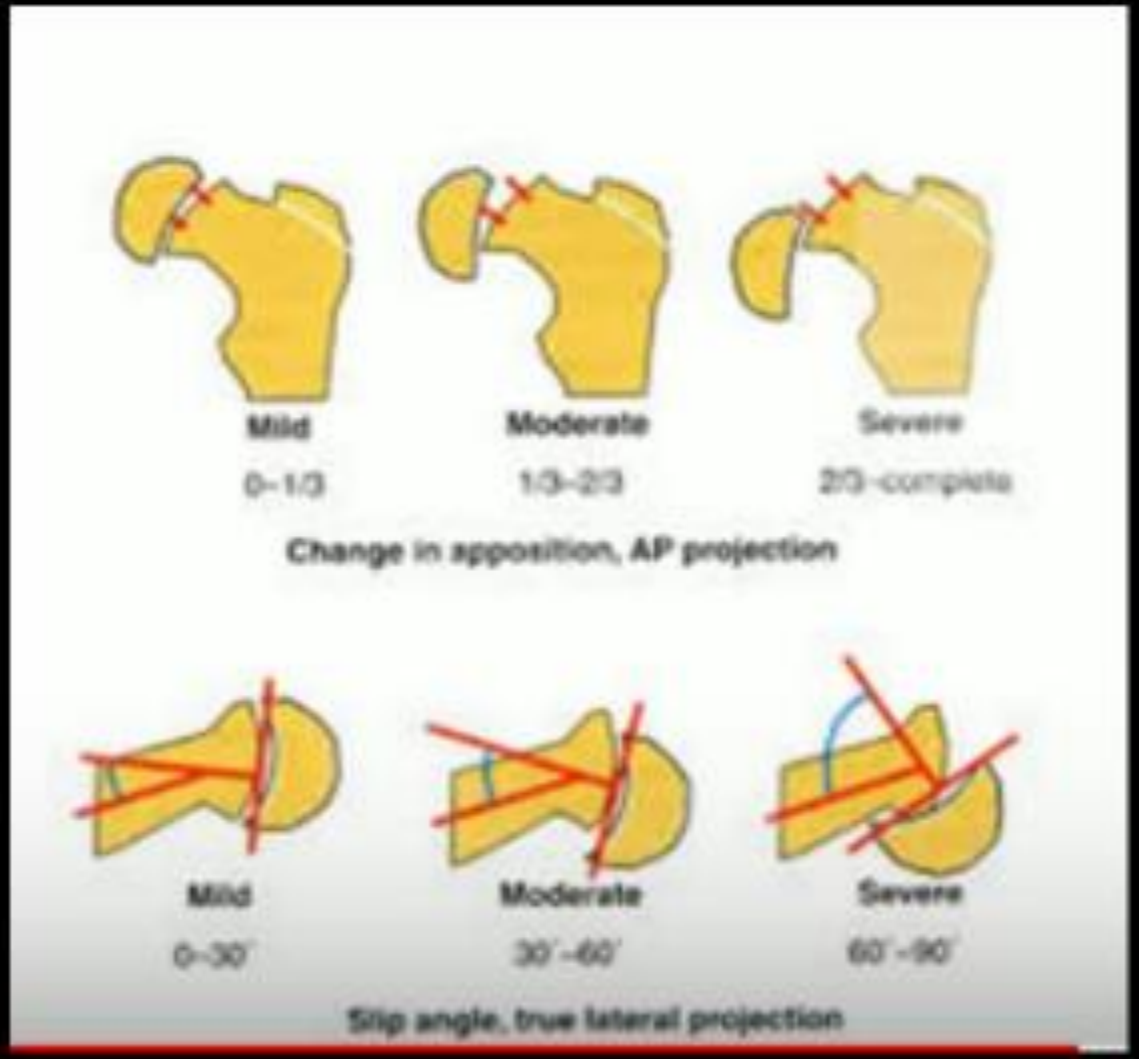
AP and frogleg views demonstrate widening of the left proximal f
There is medial and dorsal displacement of the capital femoral epiphysis.
On the frogleg view, the line drawn tangential to the lateral cortex of the left metaphysis does not bisect any portion of the ossified left epiphysis (compare with a similar tangential line on the contralateral side). Note the assymetric appearance of the left acetabulum and the irregularity of the femoral neck adjacent to the physis.

SCFE CASES


12/70KV

Slipped Capital Femoral Epiphysis

- It should be suspected in any adolescent who complains of hip or knee pain. It is twice as common in males (12-15 years) than females (10-13 years). Predisposed risk factors include obesity, renal osteodystrophy, and endocrine disorders including hypothyroidism and hypopituitarism. Bilateral involvement of the hips can be seen in 20-30% of patients, but it is unusual to present at the same time.
- Displacement of the femoral head is posteromedial and often difficult to see on a standard AP film. Findings on AP film can include asymmetric physeal widening and/or an indistinct metaphyseal border at the level of the physis. Frogleg lateral views are often essential for diagnosis as minimal slippage can be better appreciated.
- SCFE is typically treated surgically with pin fixation (done at current location) to prevent further slippage. Potential complications include avascular necrosis and chondrolysis.


Mild
0-1/3
Moderate
1/3-2/3
Severe
2/3-complete
Change in apposition, AP projection
Mild
0-30°
Moderate
30°-60°
Severe
60°-90°
Slip angle, true lateral projection