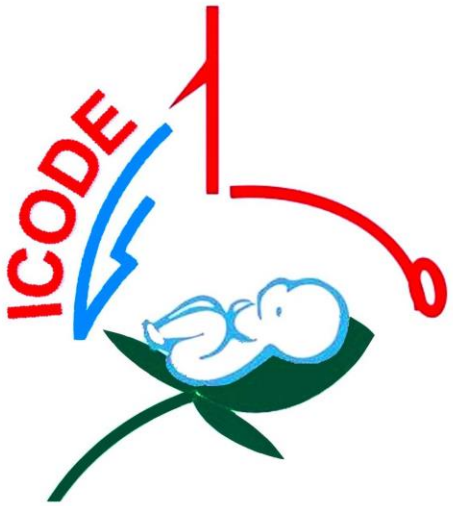
Graf Hip Types



Anatomical Identification

checklist 1

1) Chondro-osseous border

2) Femoral head

3) Synovial fold

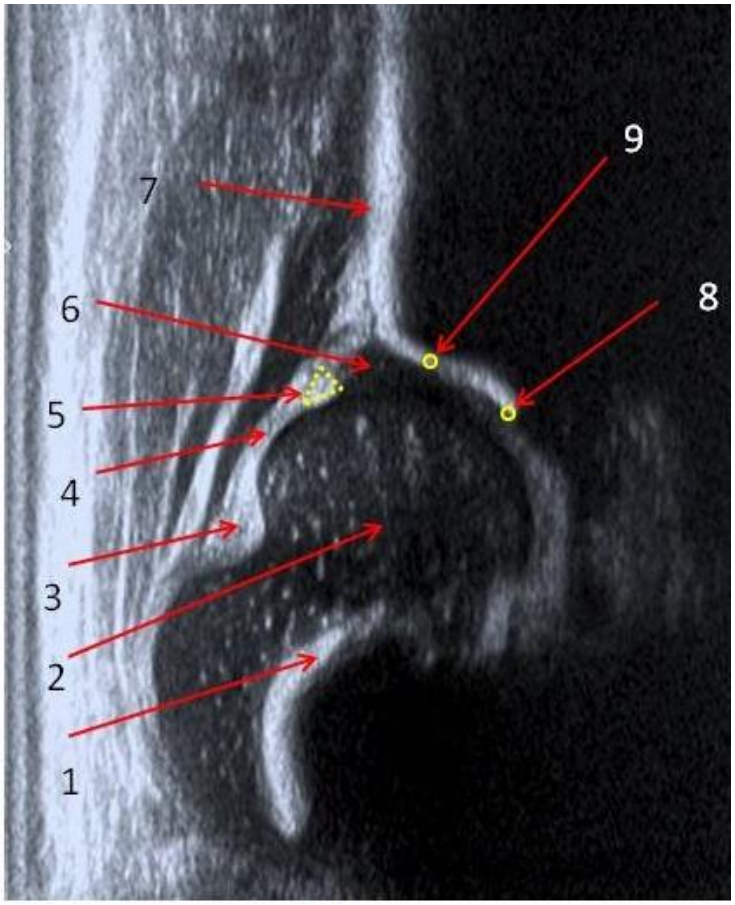
4) Joint capsule

5) Labrum

6) Hyaline cartilage roof

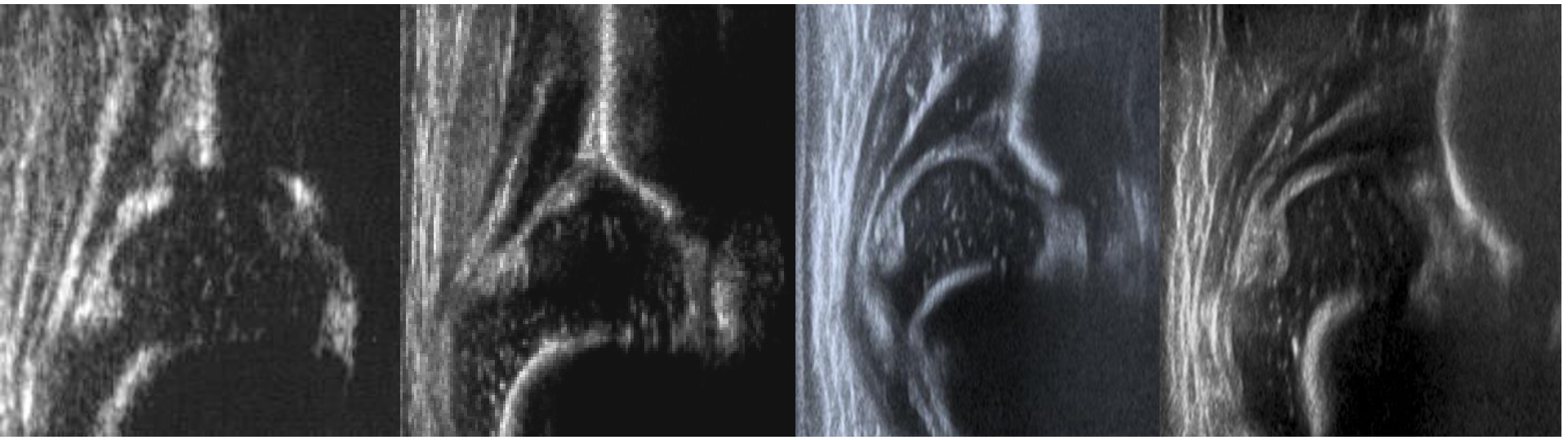
7) Bony roof

8 + 9 concavity to convexity (turning point)



50% of diagnostic errors due to this list being incomplete!

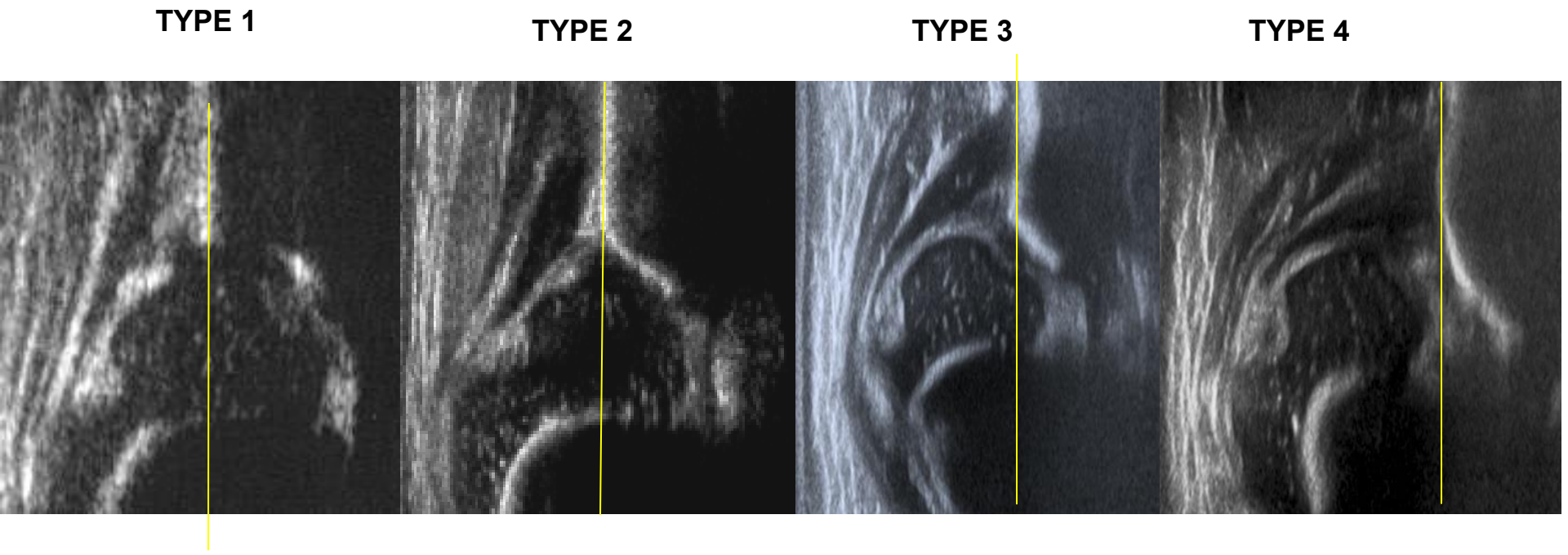
Graf Sonographic Hip Types



Centered Hips

Decentered Hips

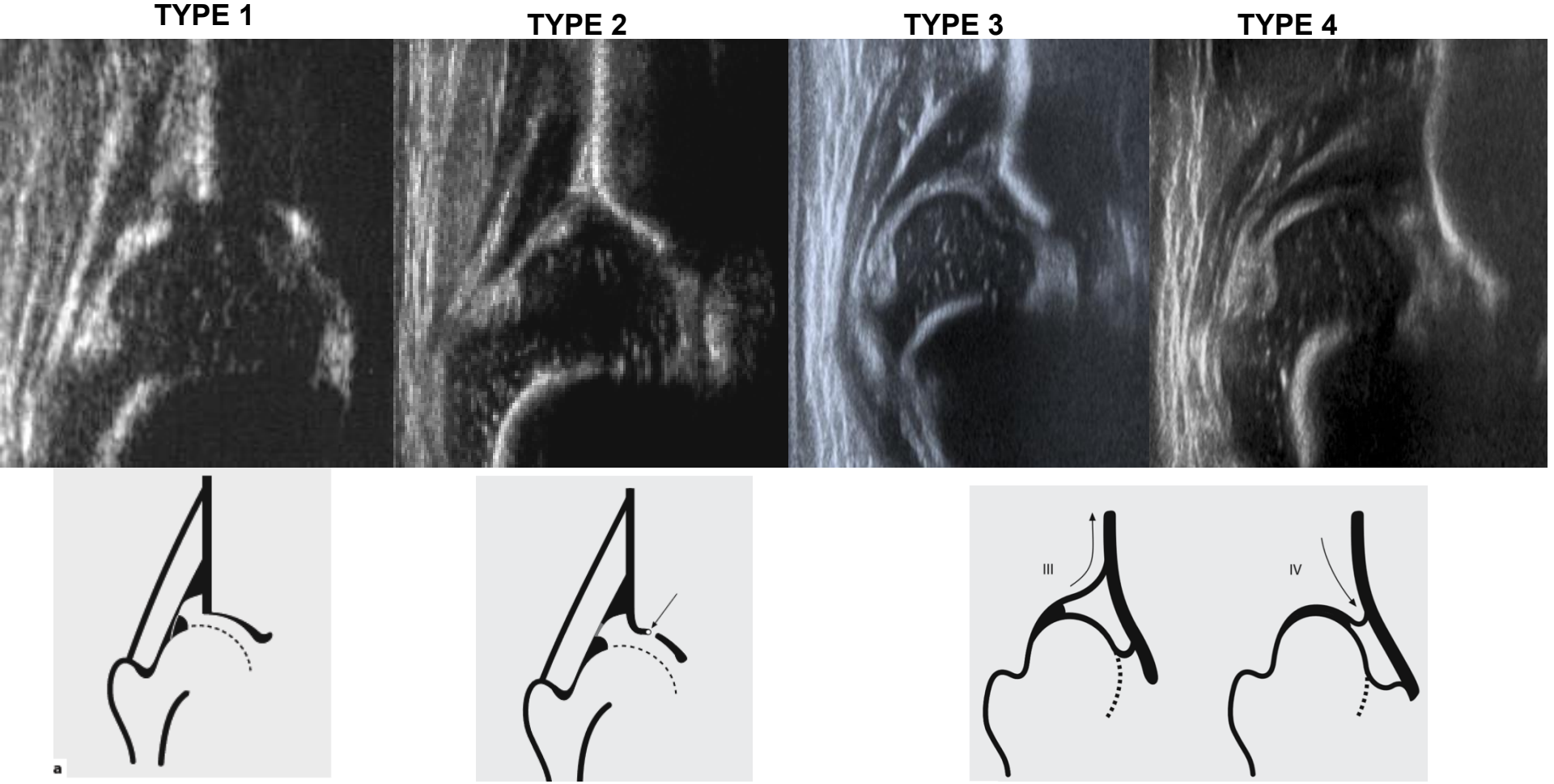
Graf Sonographic Hip Types



Centered Hips

Decentered Hips

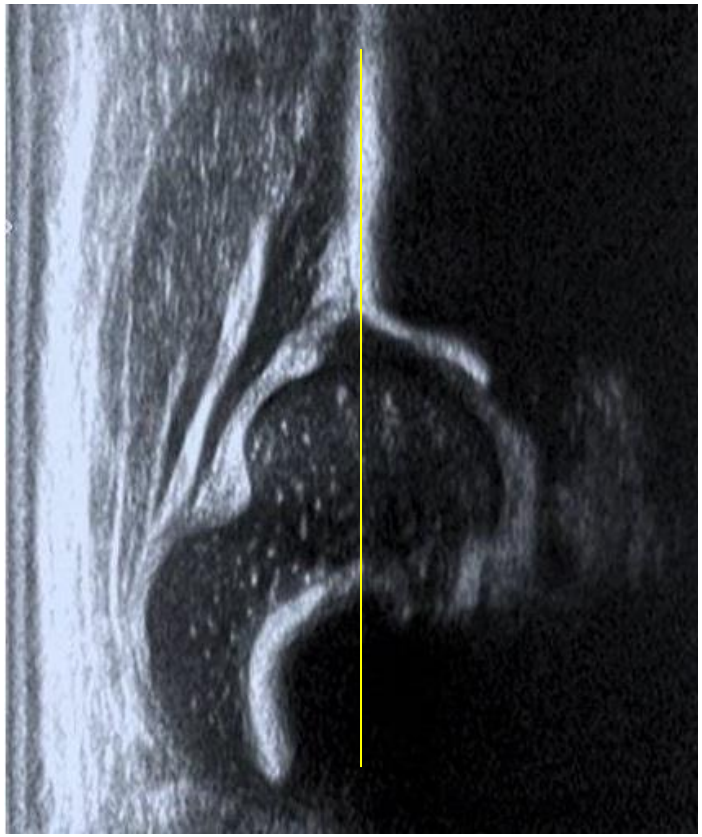
Graf Sonographic Hip Types

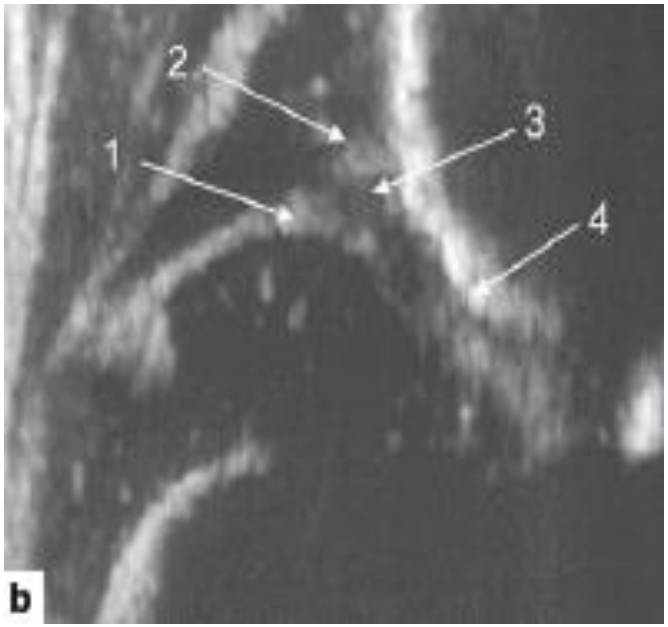


Decentred hips

Labrum is above turning point

Type 1





Decentred hips

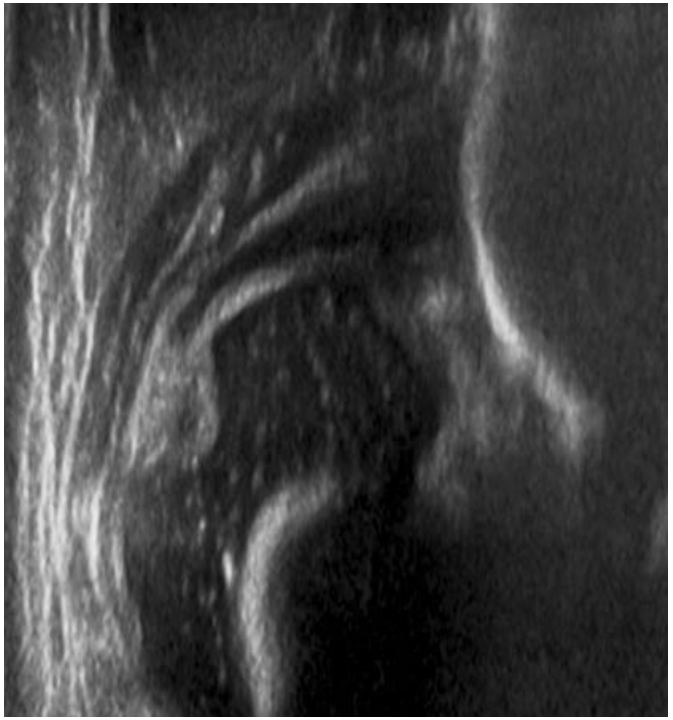
Labrum is above turning point

Type 1

Decentred hips

Labrum is above turning point

Type 1



Decentred hips

Labrum is above turning point

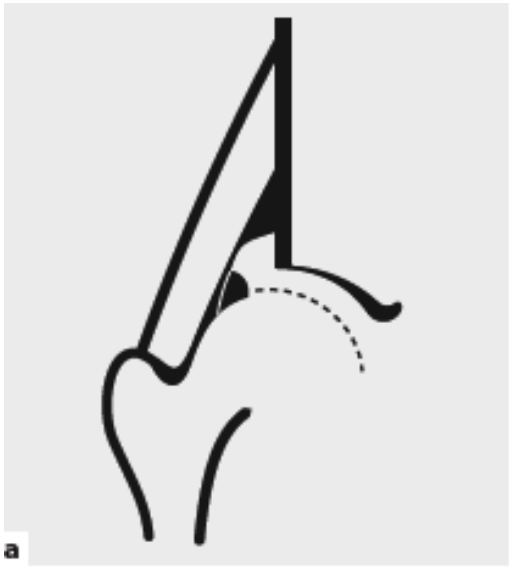
Type 1

Type 1

Description

- Centered
- Bony roof is good
- Acetabular cartilage covers head
- Acetabular edge is angular/ blunt

Appearance



Type 1
acetabular edge

1. Angular

2. Blunt

When can a Type 1 deteriorate

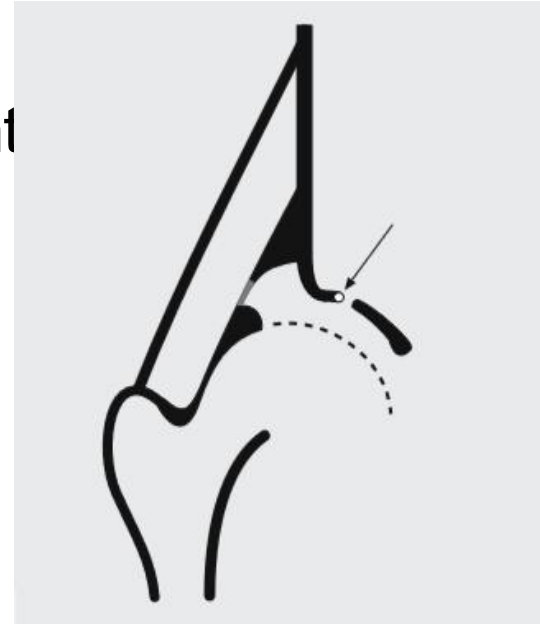
- Neuromuscular disorder
- Hip joint infection
- Secondary dysplasia
  - a previous decentered hip which is treated and becomes Type 1 can deteriorate later

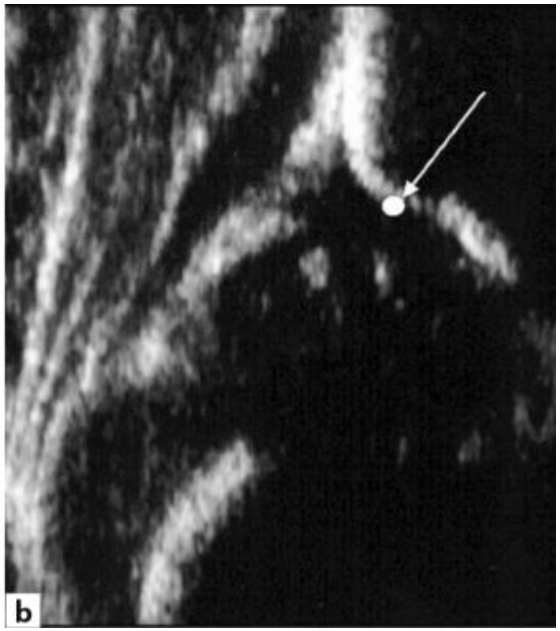
Type 2

Description

- Centered
- Bony roof is deficient
- Acetabular cartilage covers head
- Acetabular edge is rounded

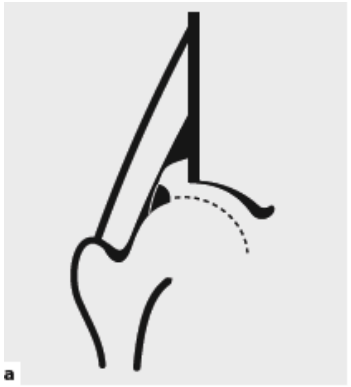
Appearance



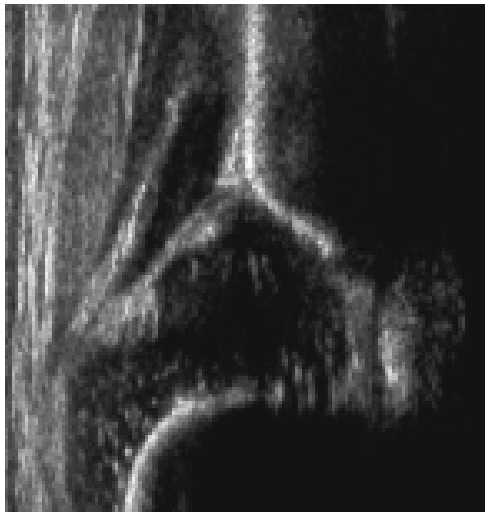


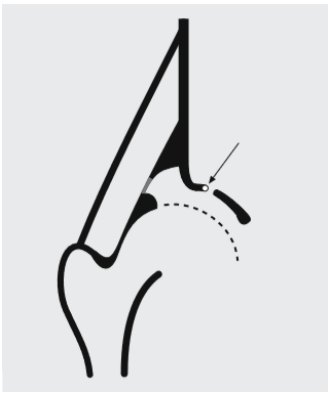
Graf Type 1 / Type 2

TYPE 1



TYPE 2

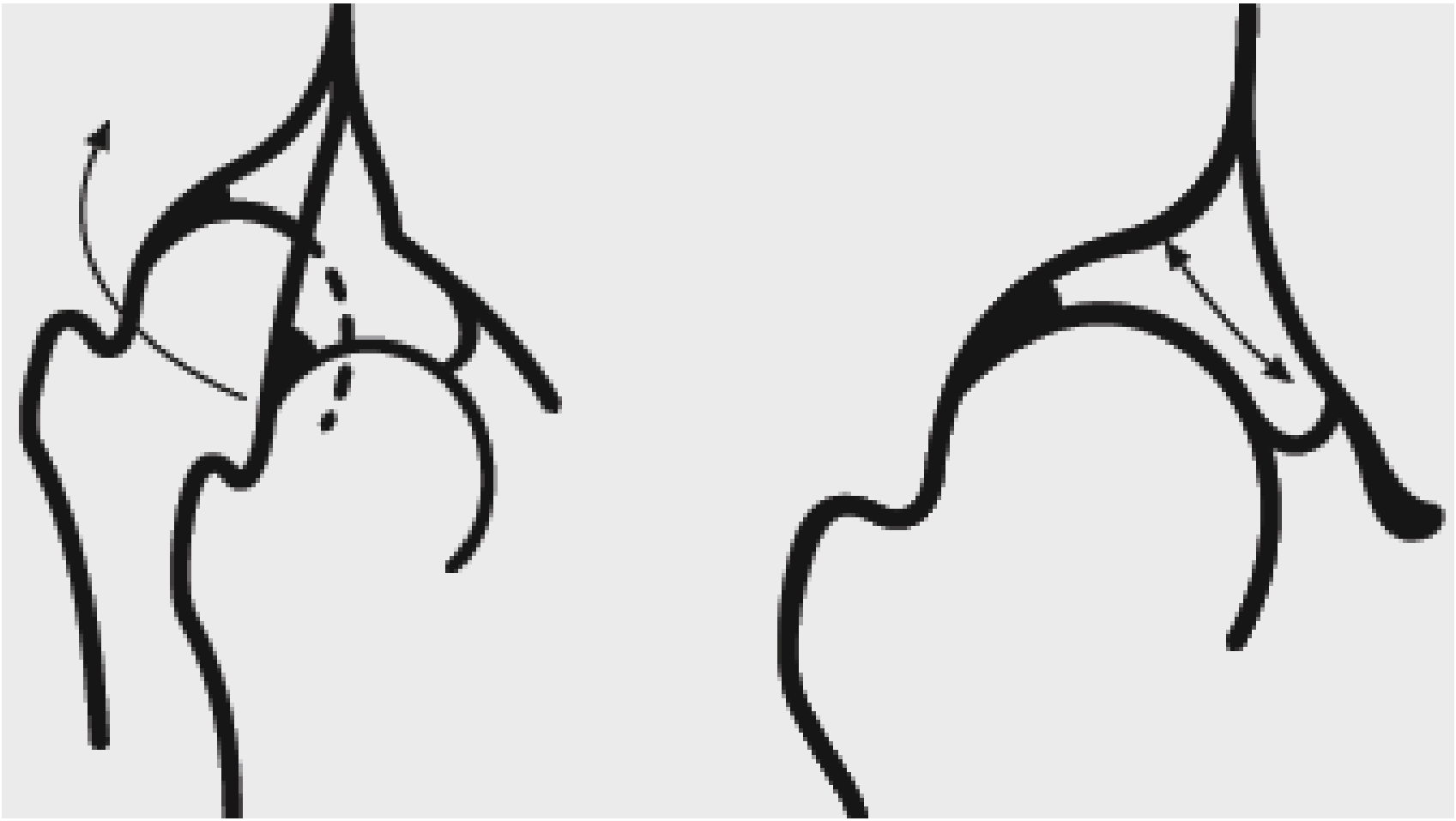




Type 2

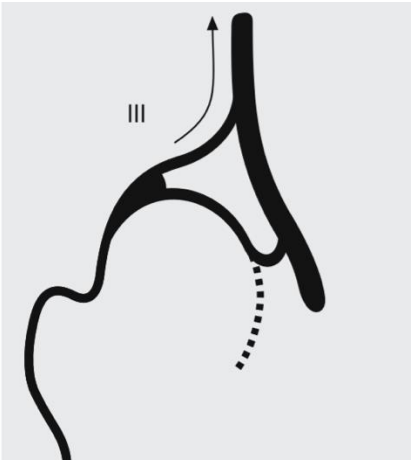
- Subdivided into
  - II a
  - II b
  - II c
- Requires measurements

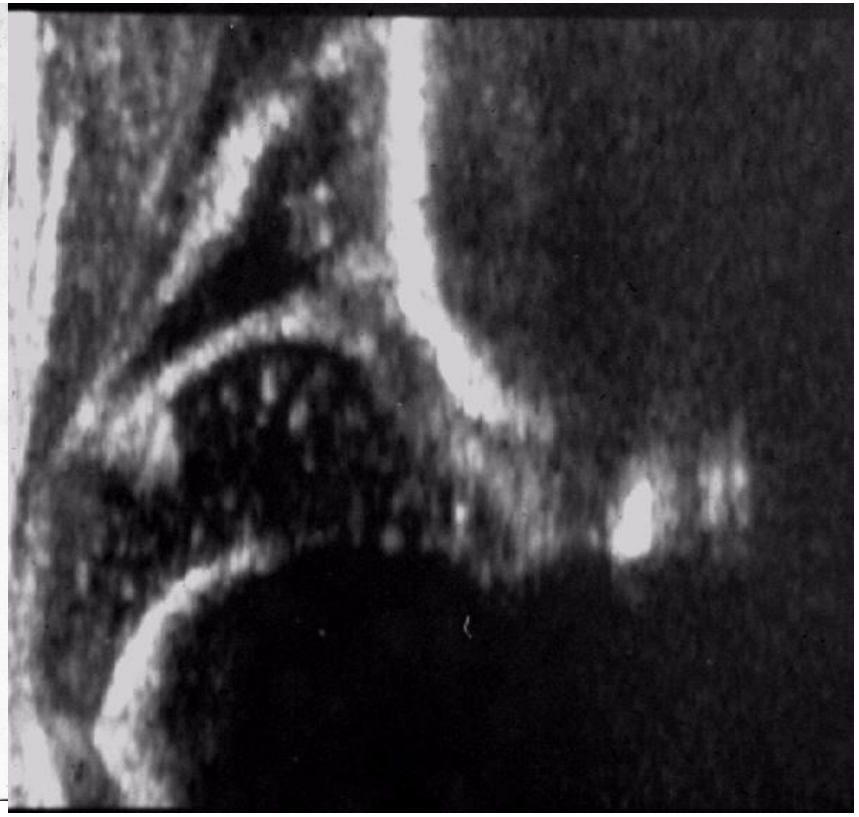
Type 2 to 3



Type 3

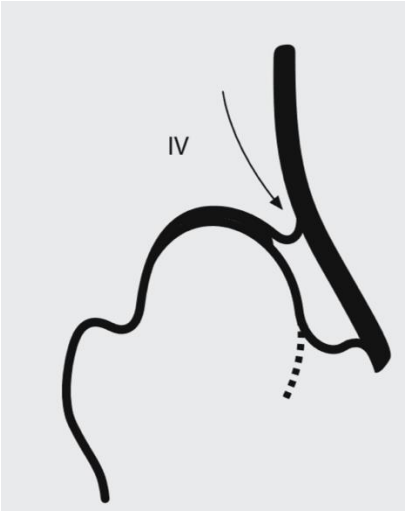
- Decentred hip or dislocated
- Some cartilage pushed upwards
  - Perichondrium goes upward
- Bony roof poor
- Acetabular edge flat





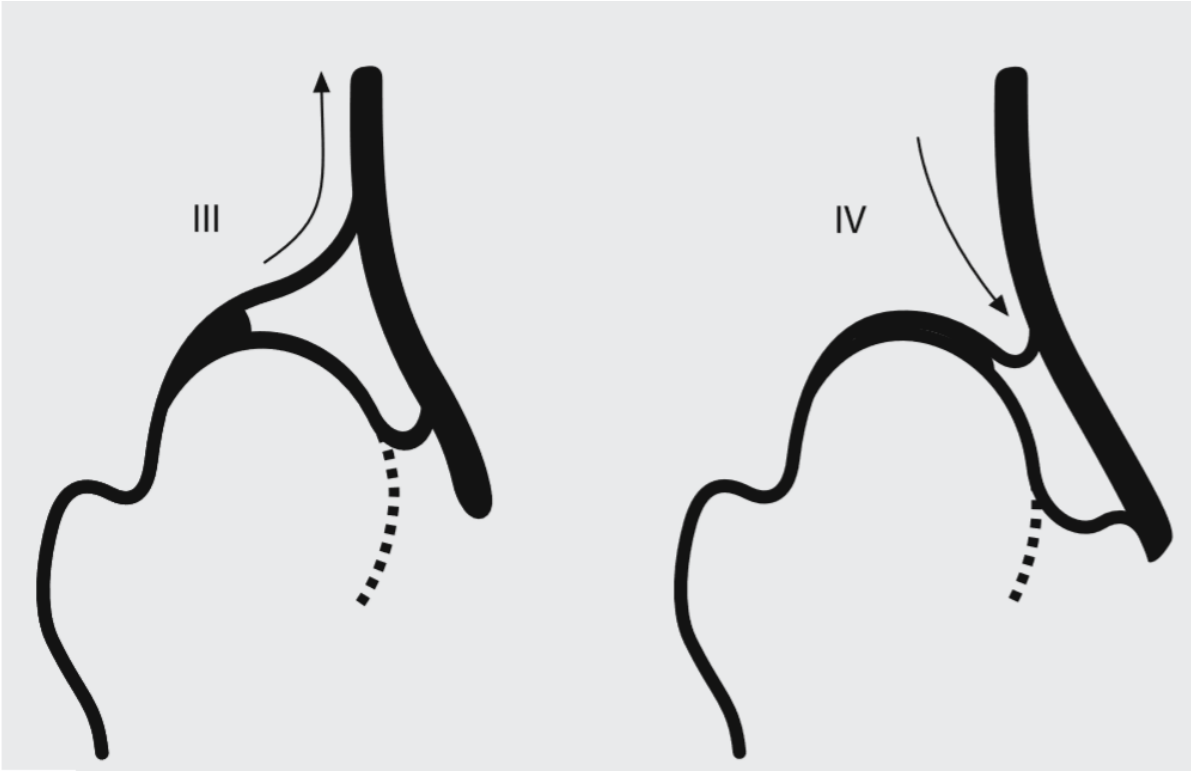
Type 4

- Decentred hip or dislocated
- All cartilage pushed down
  - Perichondrium goes horizontal
- Bony roof poor
- Acetabular edge flat



Decentered hip

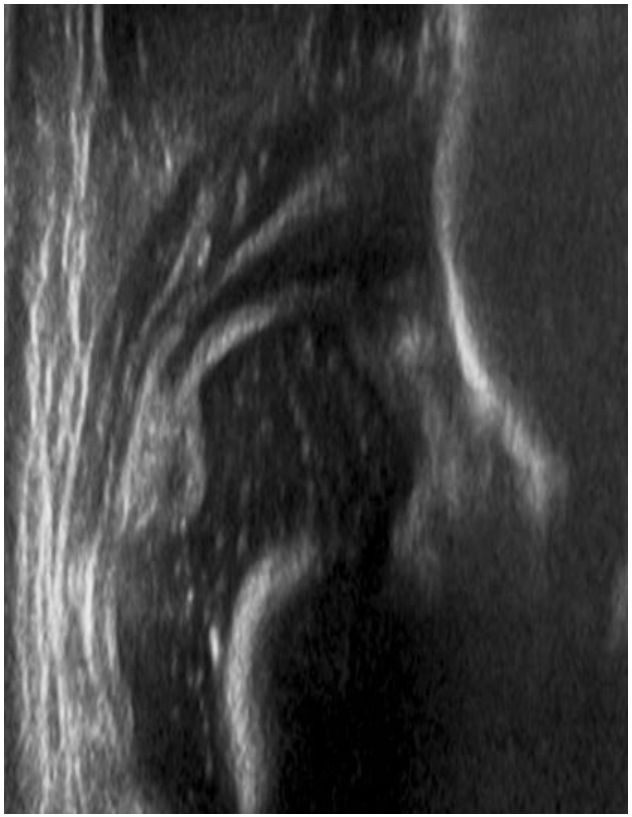
Perichondrium is key



Difference between 3 and 4

3

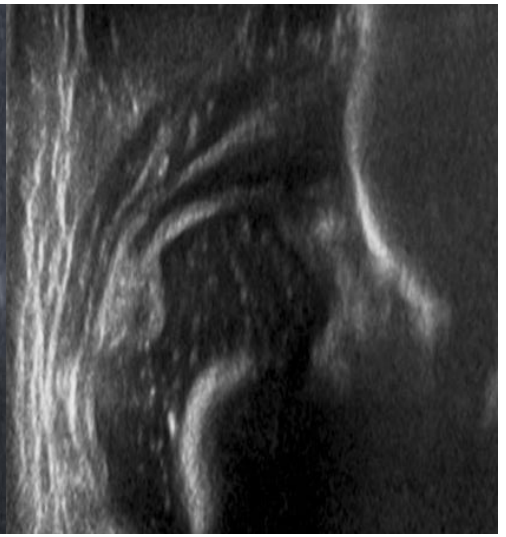
4



Summary
Graf Sonographic Hip Types

Centered Hips

Decentered Hips

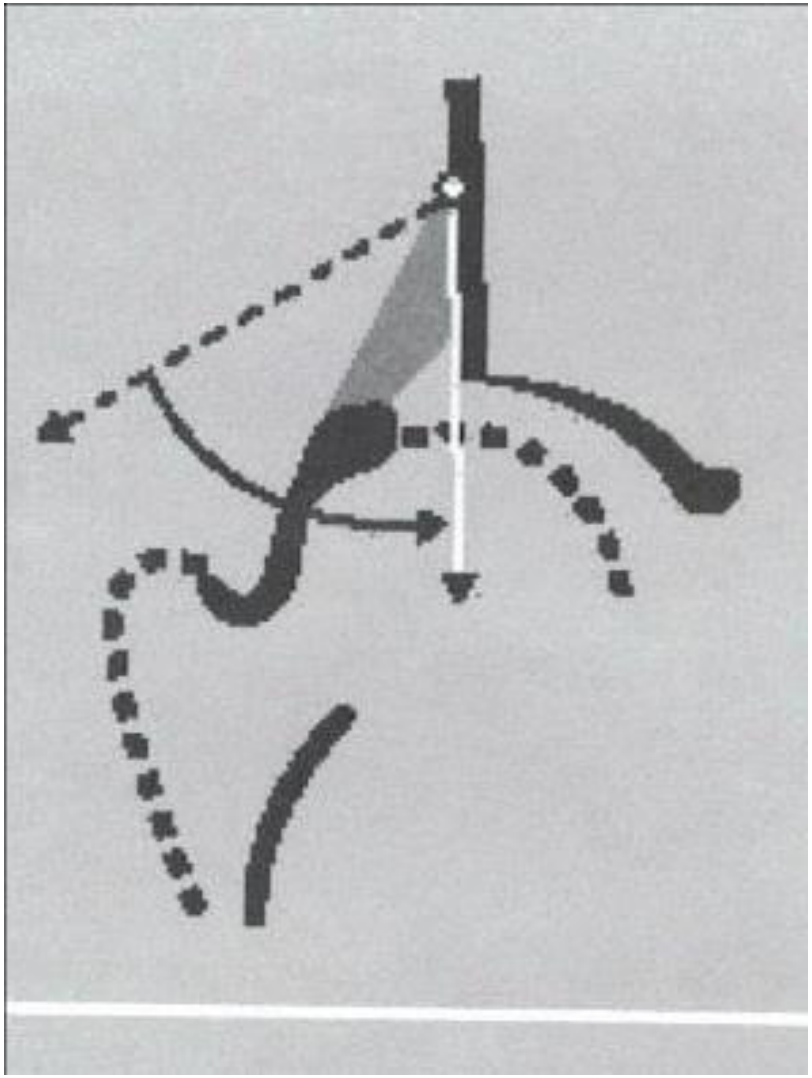


TYPE 1	TYPE 2	TYPE 3	TYPE 4
good bony cover	deficient bony cover	cartilage pushed up	pushed down

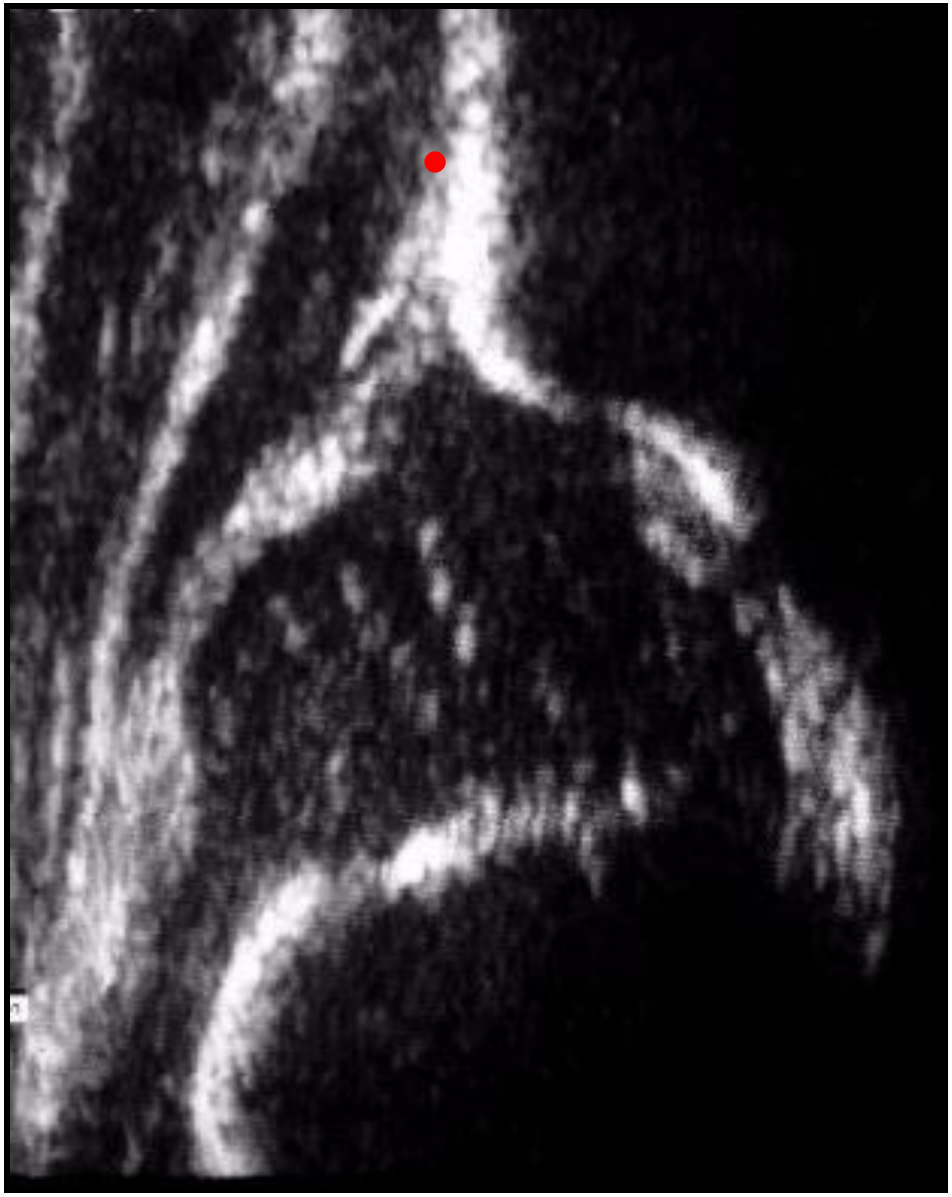
Measurement and Classification

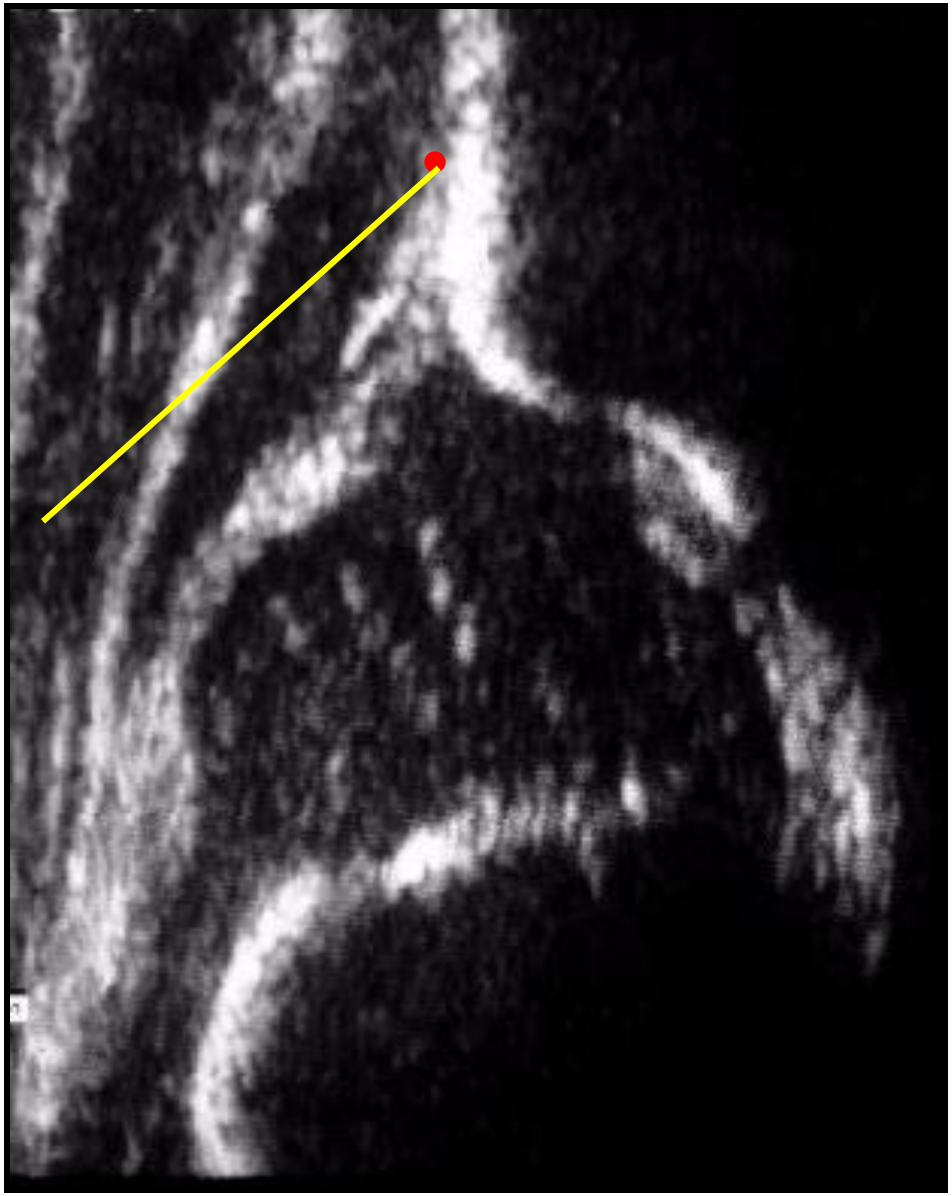
Measurement can only be carried out in the standard plane
type 3 and 4 – no measurements

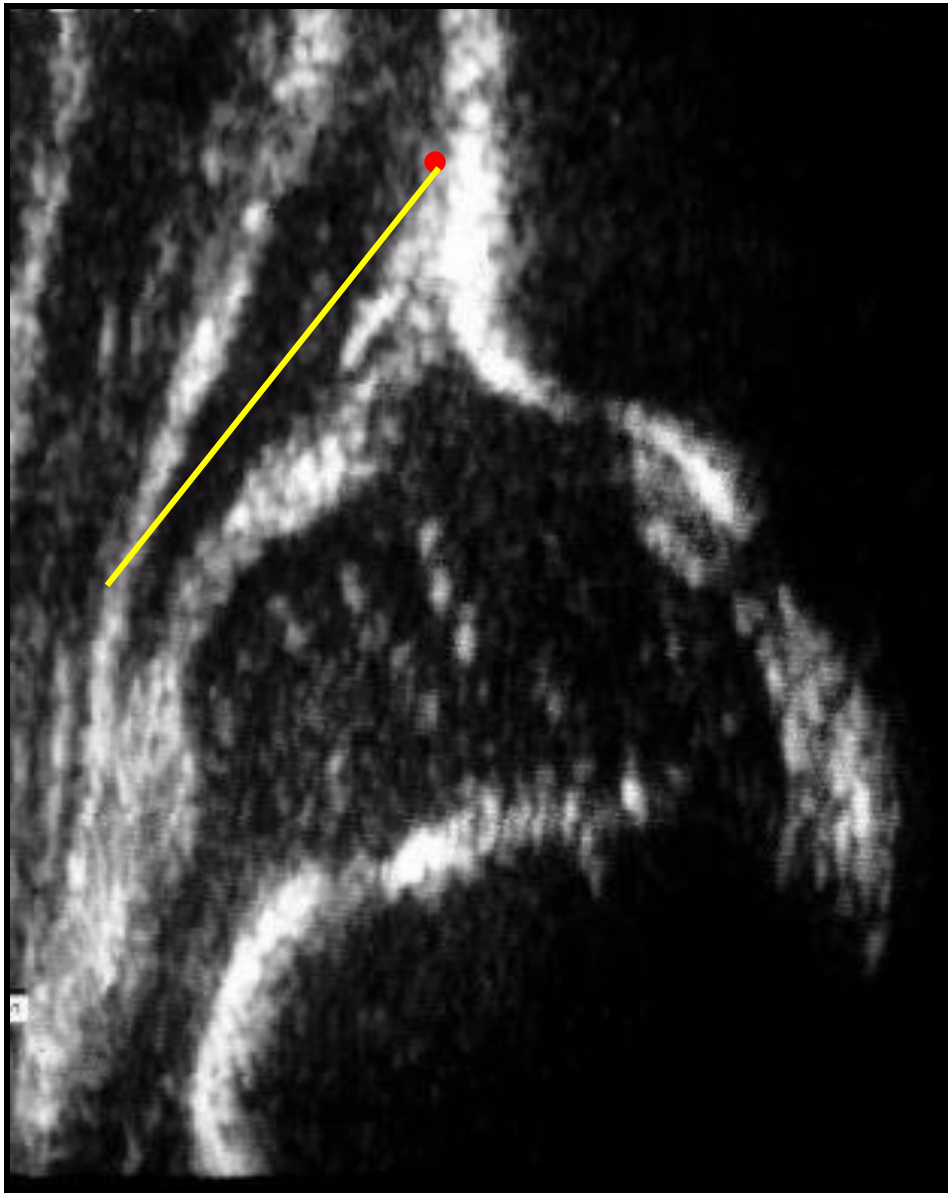
BASE LINE



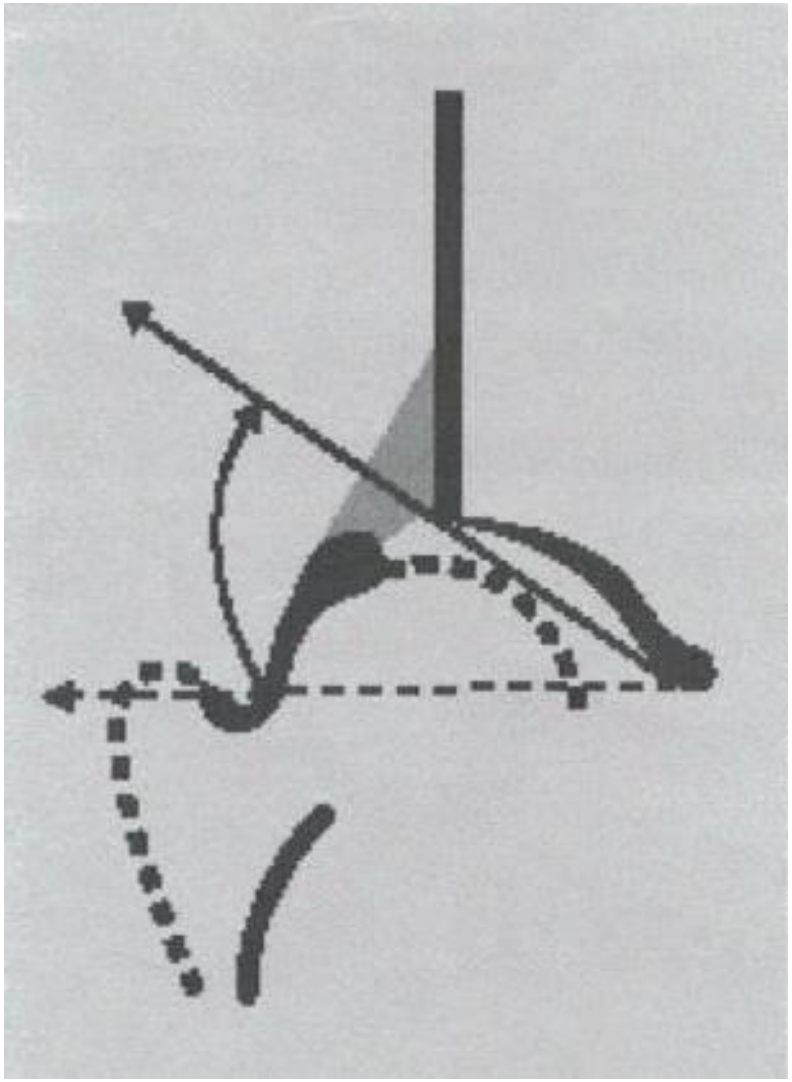
- Identify point where proximal perichondrium meets ilium
- Pivot from this point till Tangential to the ilium.



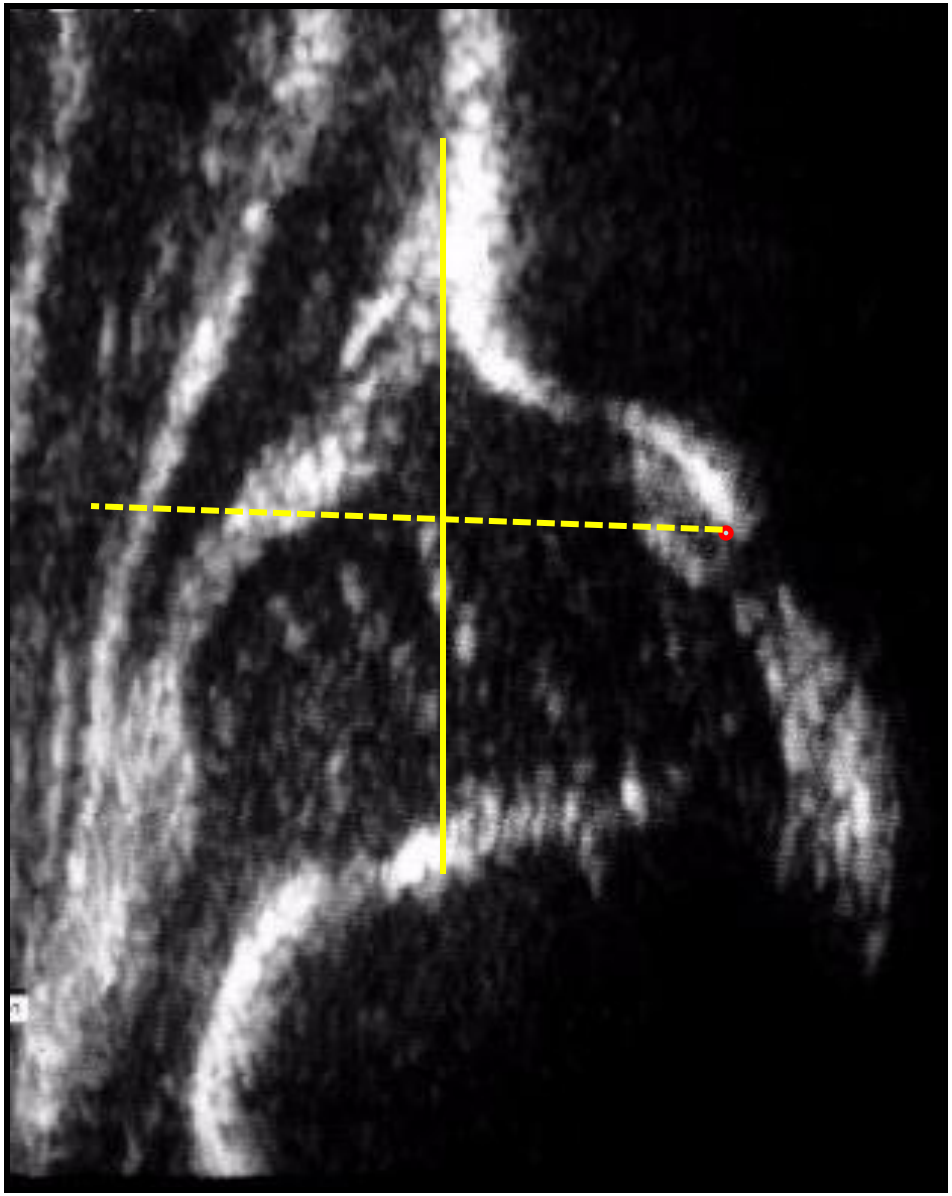


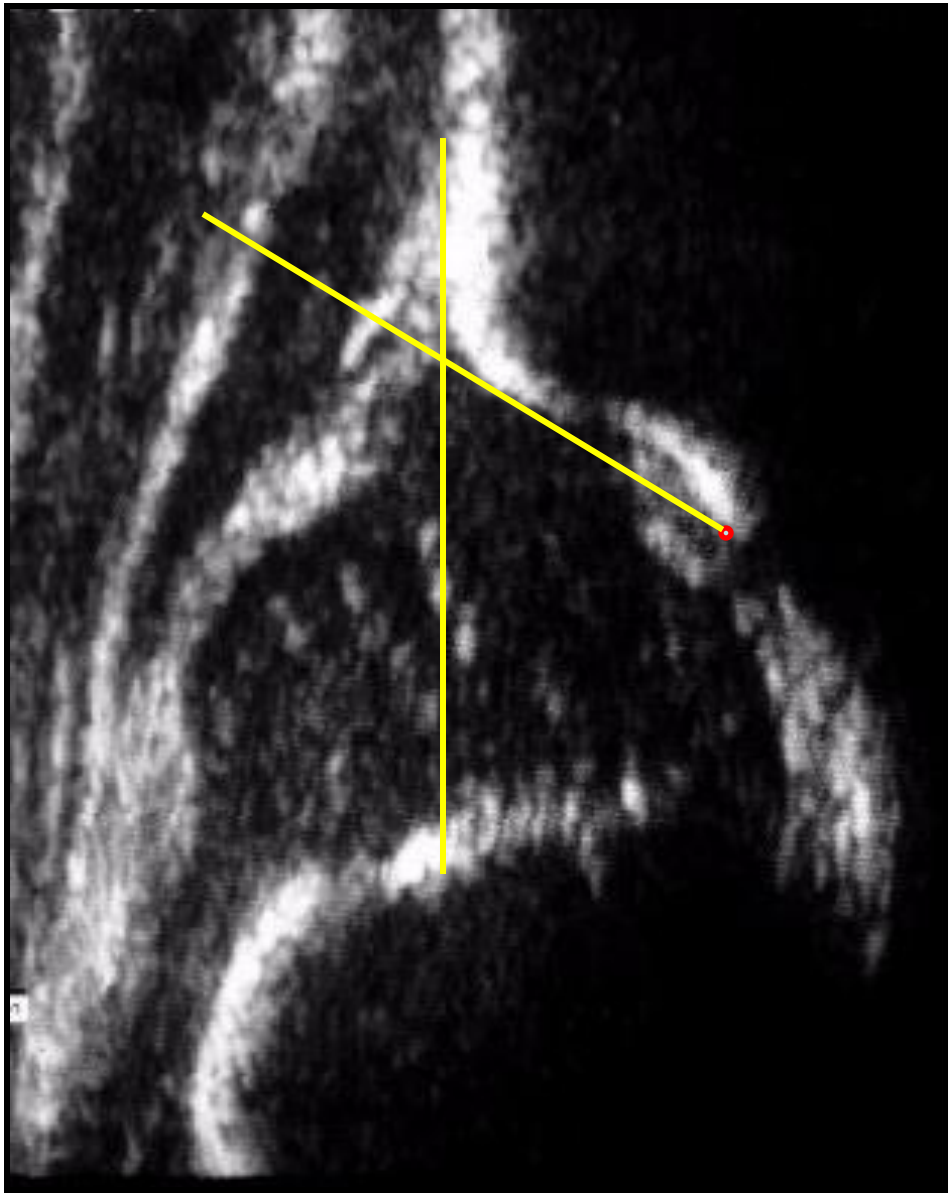


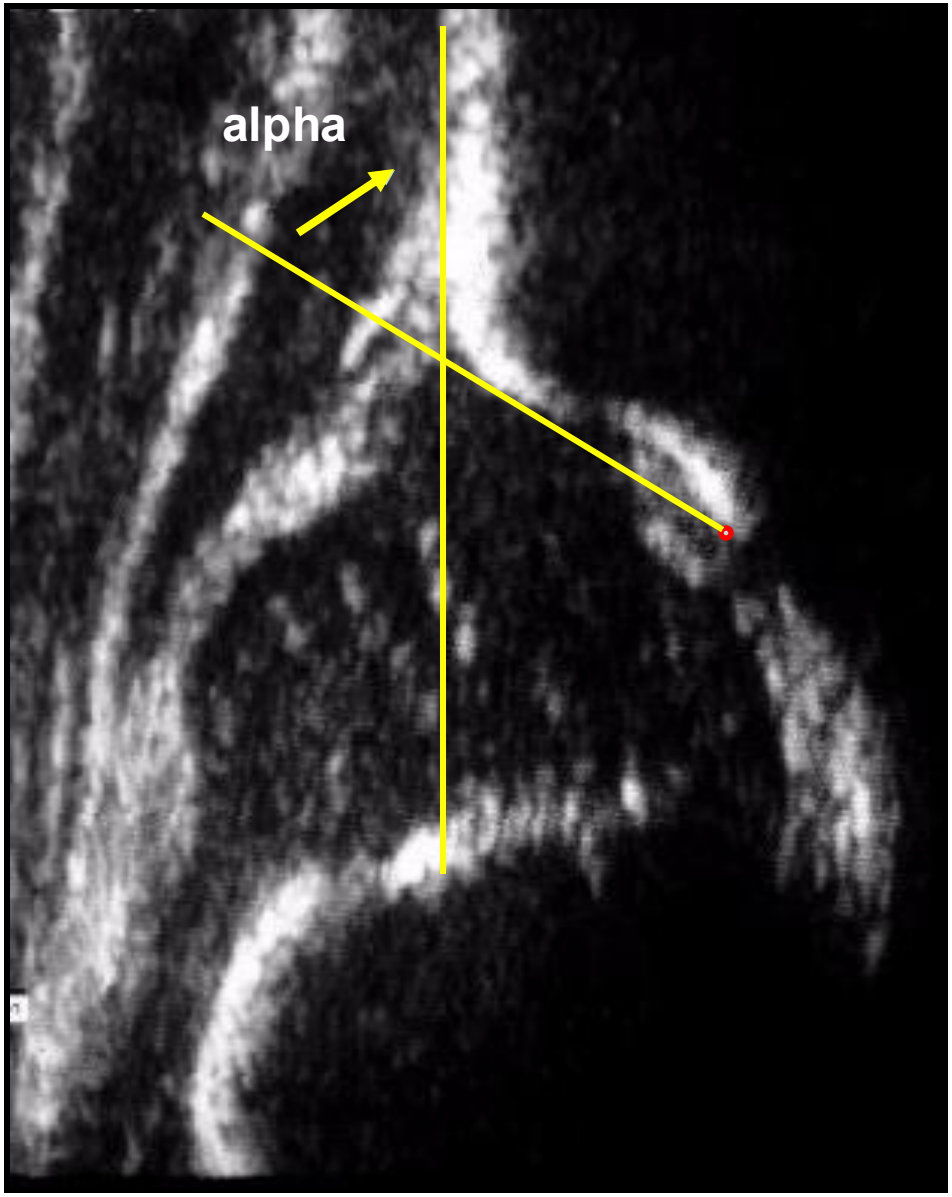
BONY ROOF LINE



- Tangential to bony roof
- Pivot from Lower limb
- Identify TRUE lower limb:-
- Beware other echoes
  - Vascular sinusoids in cartilage
  - Fatty tissue
  - Ligamentum teres






alpha

CARTILAGE ROOF LINE

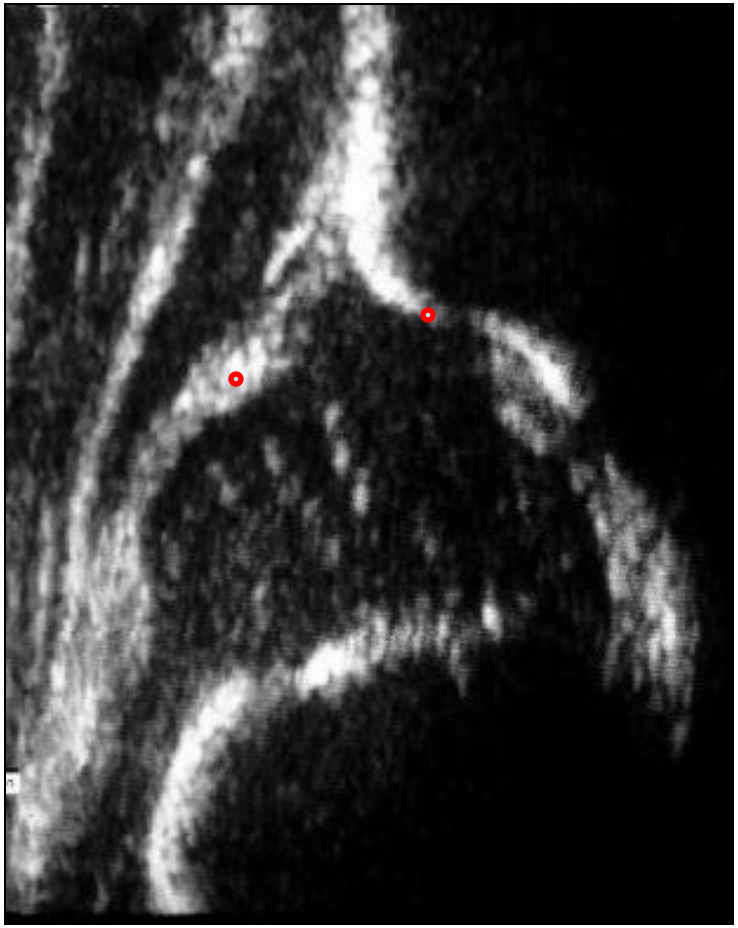
From turning point

through the centre of labrum

CARTILAGE ROOF LINE

From turning point

through the centre of labrum

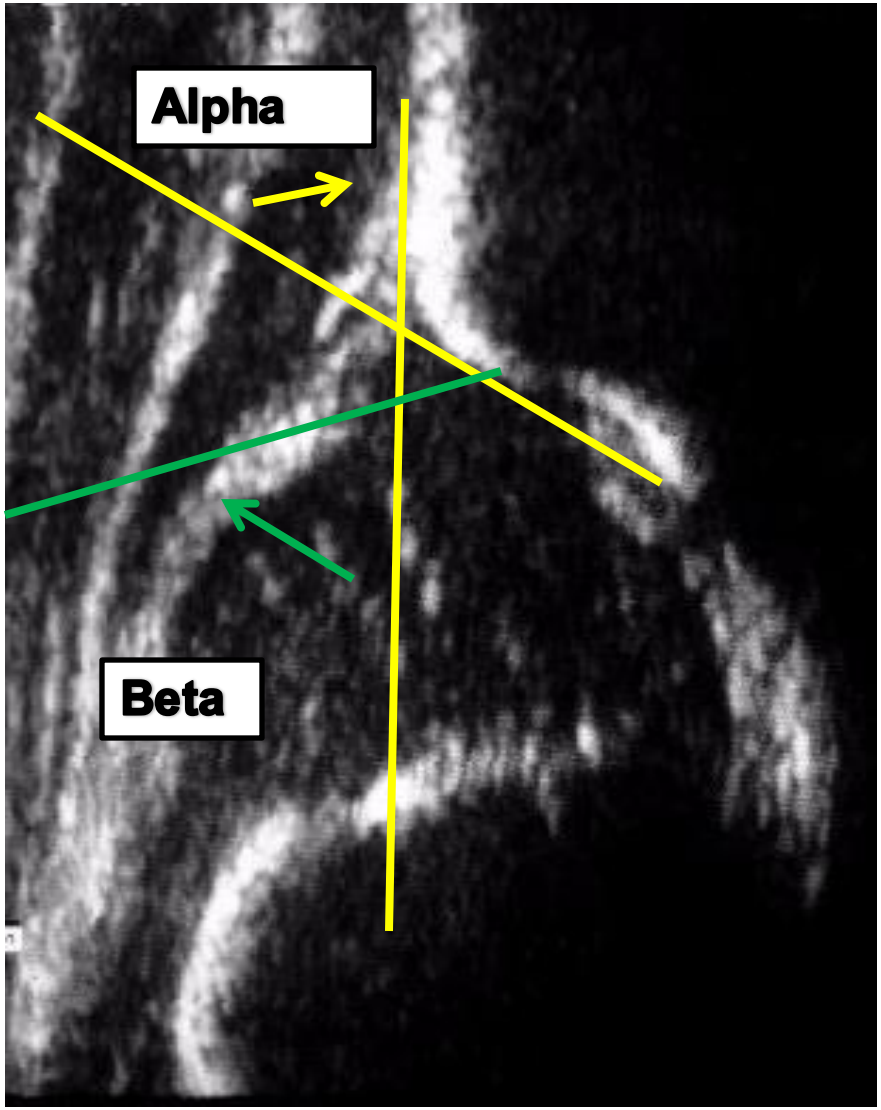


CARTILAGE ROOF LINE

From turning point

through the centre of labrum

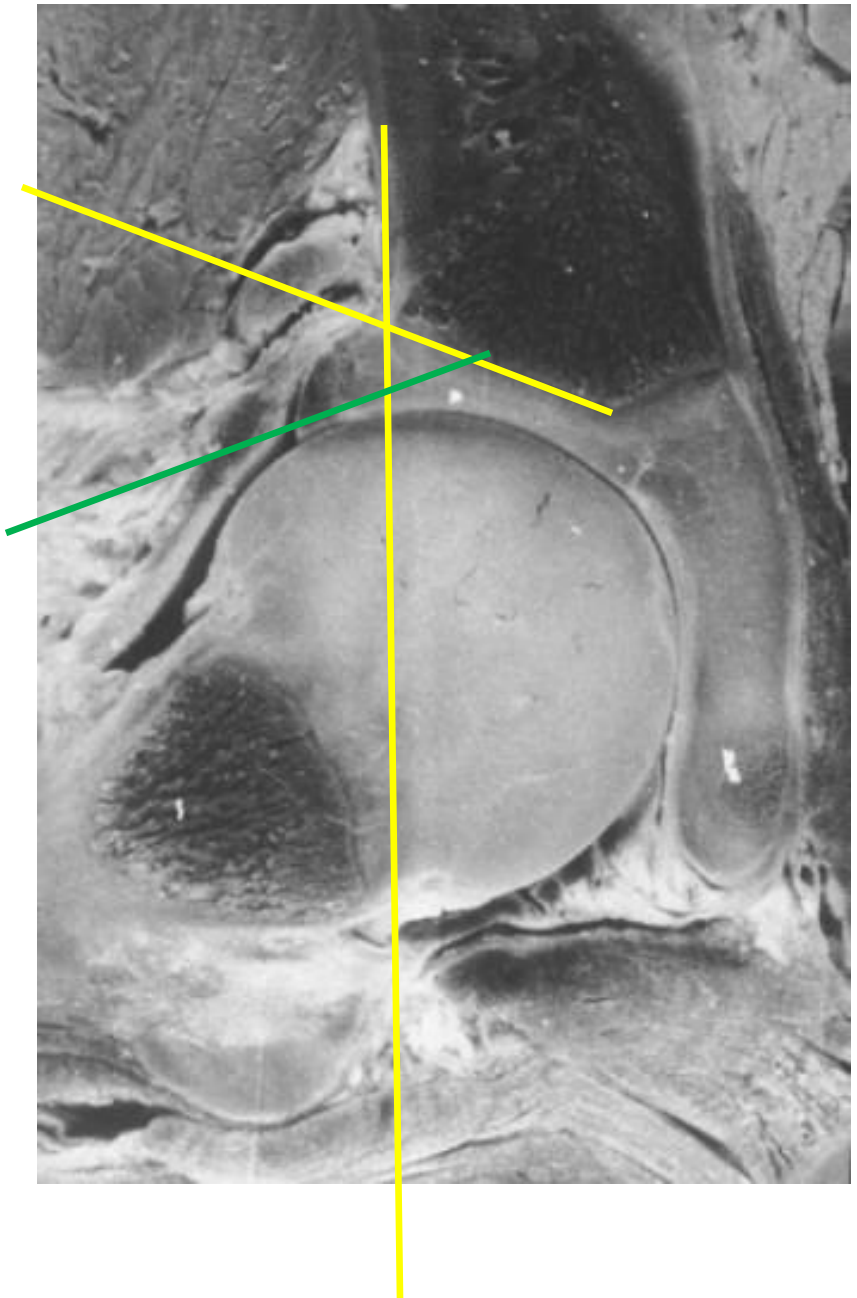
MEASUREMENTS

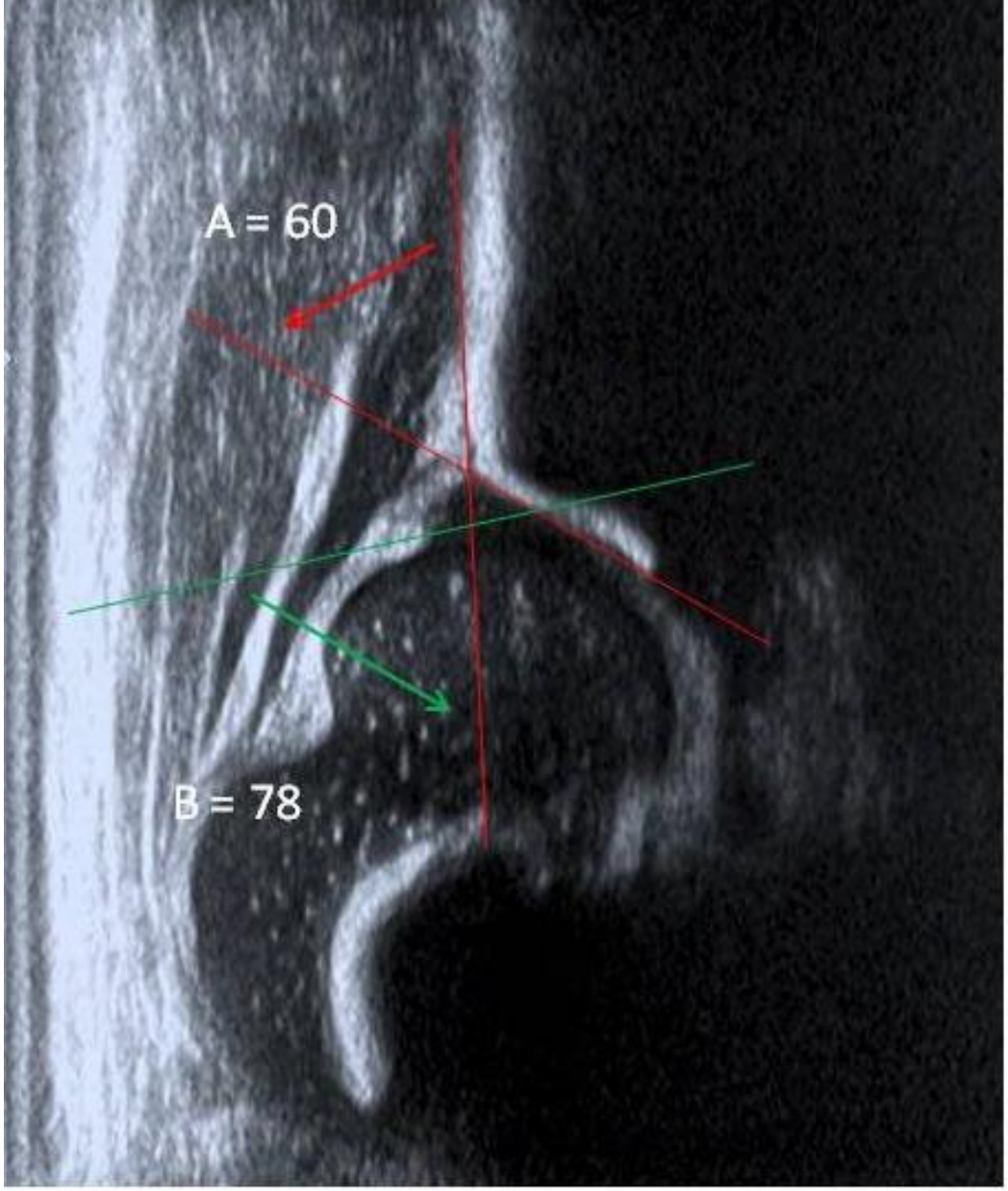


- ALPHA angle – baseline and bony roof line
- Evaluates bony socket

- BETA angle – baseline and cartilage roof line
- Evaluates cartilage roof

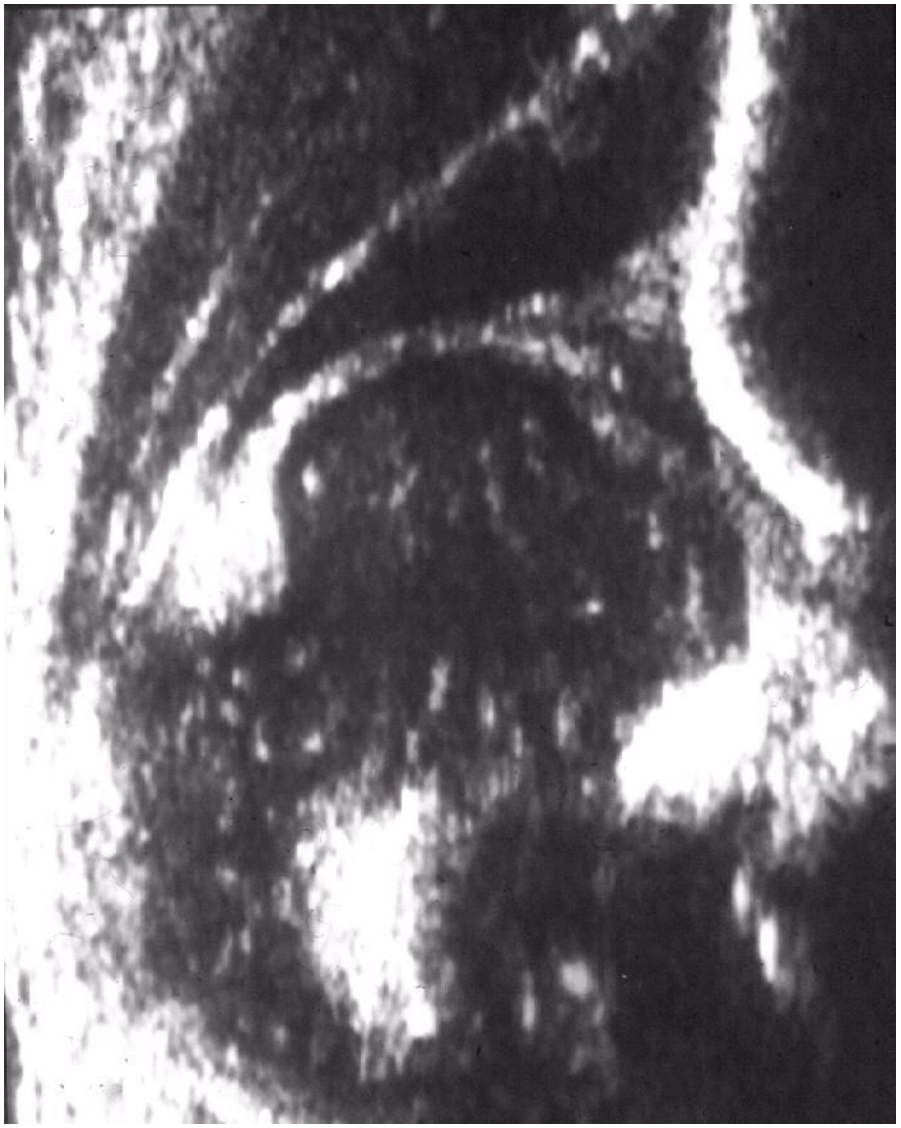
- Note – three lines do not usually meet at one point!

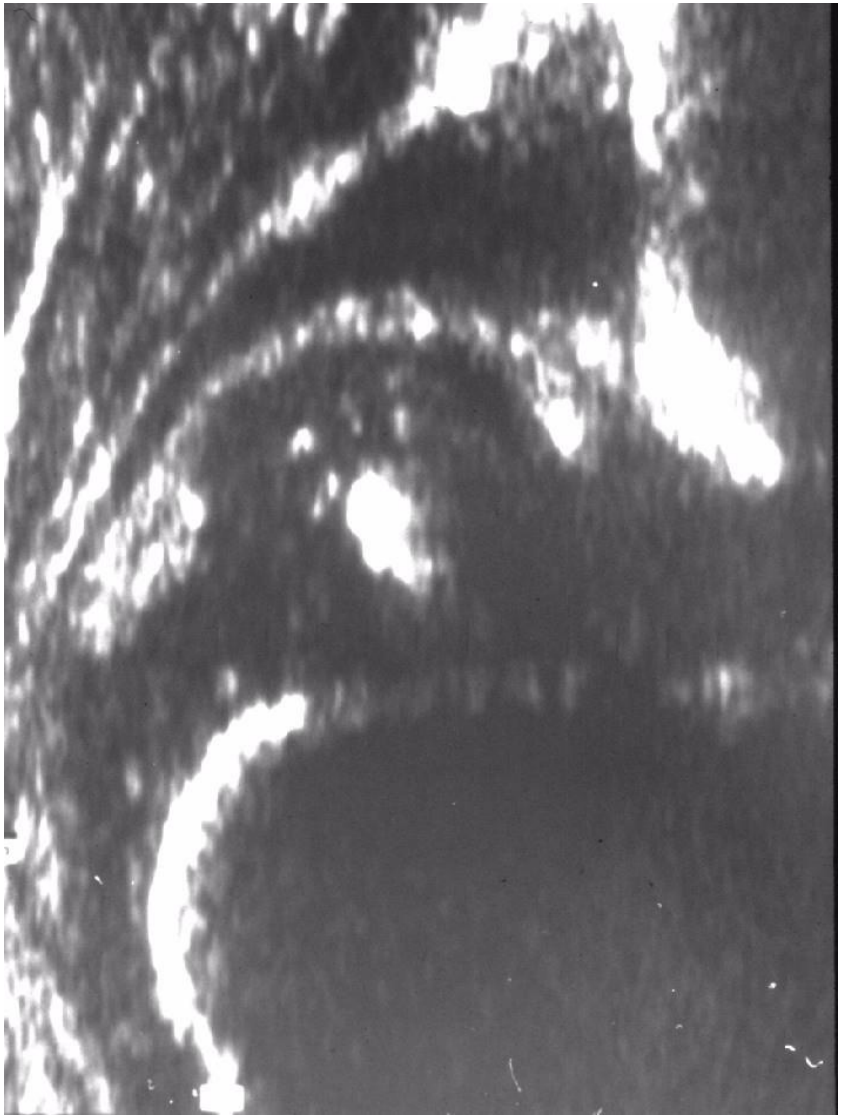


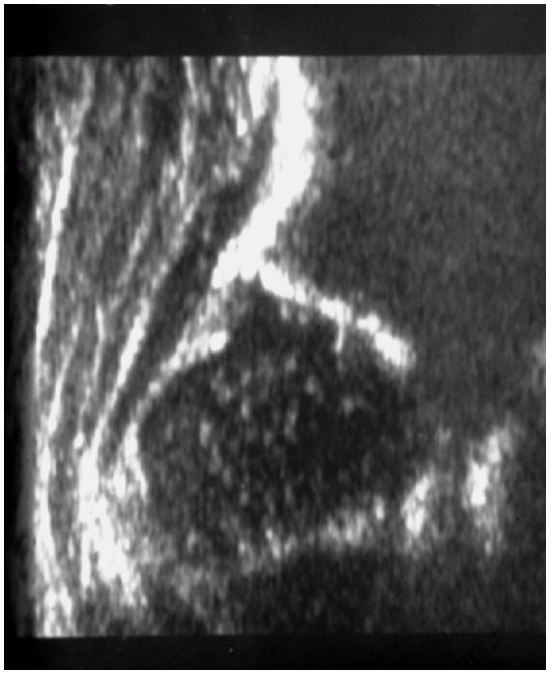

A = 60
B = 78

Only Measure hips

- In the standard plane
- Lower limb plane labrum visible
- Type 3 and 4 do not need measurement

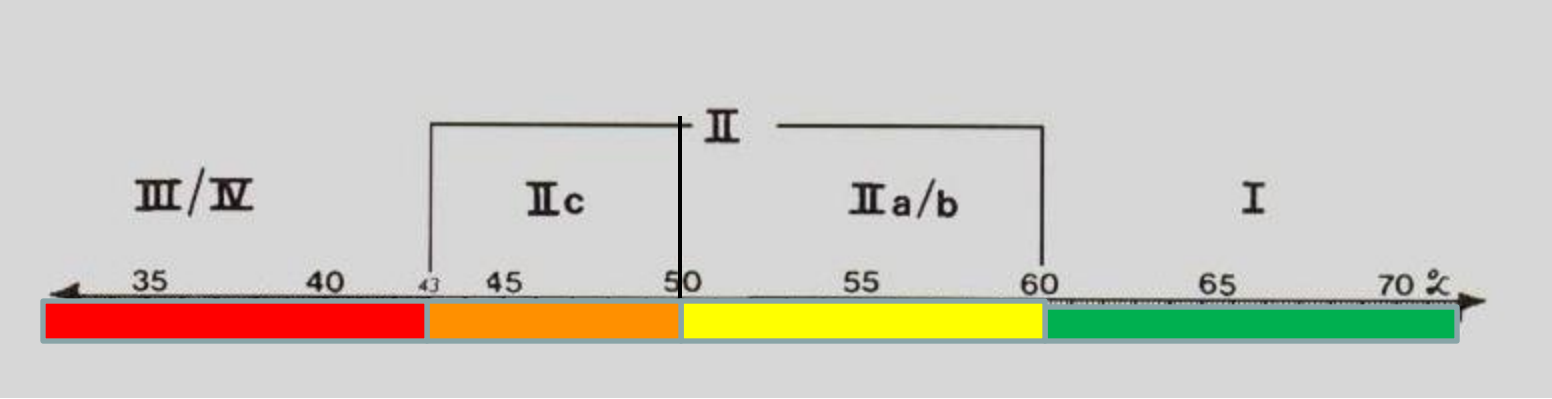






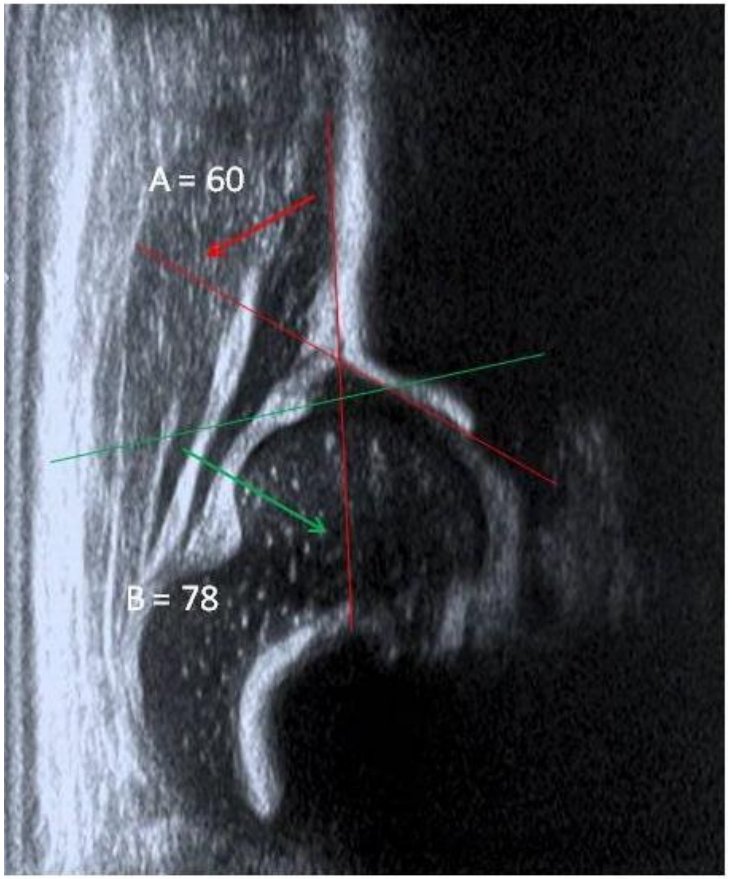
Alpha value

If all Alpha values are plotted on a line, three large subdivisions can be differentiated.



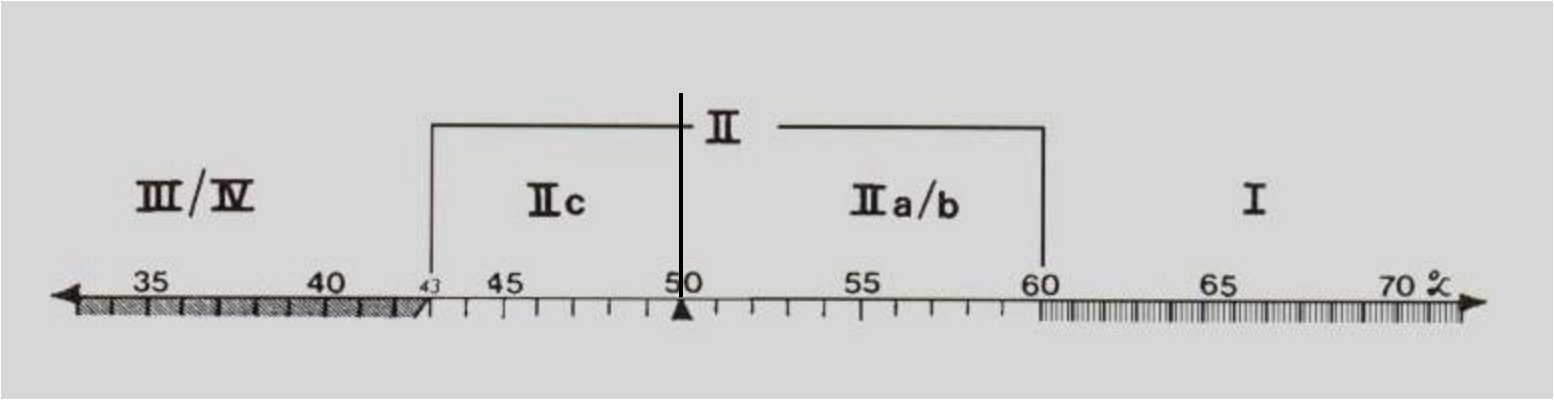
TYPE I
Alpha angle 60 degrees or more

- Mature normal hip



TYPE II HIPS
Alpha angle 43-59 degrees

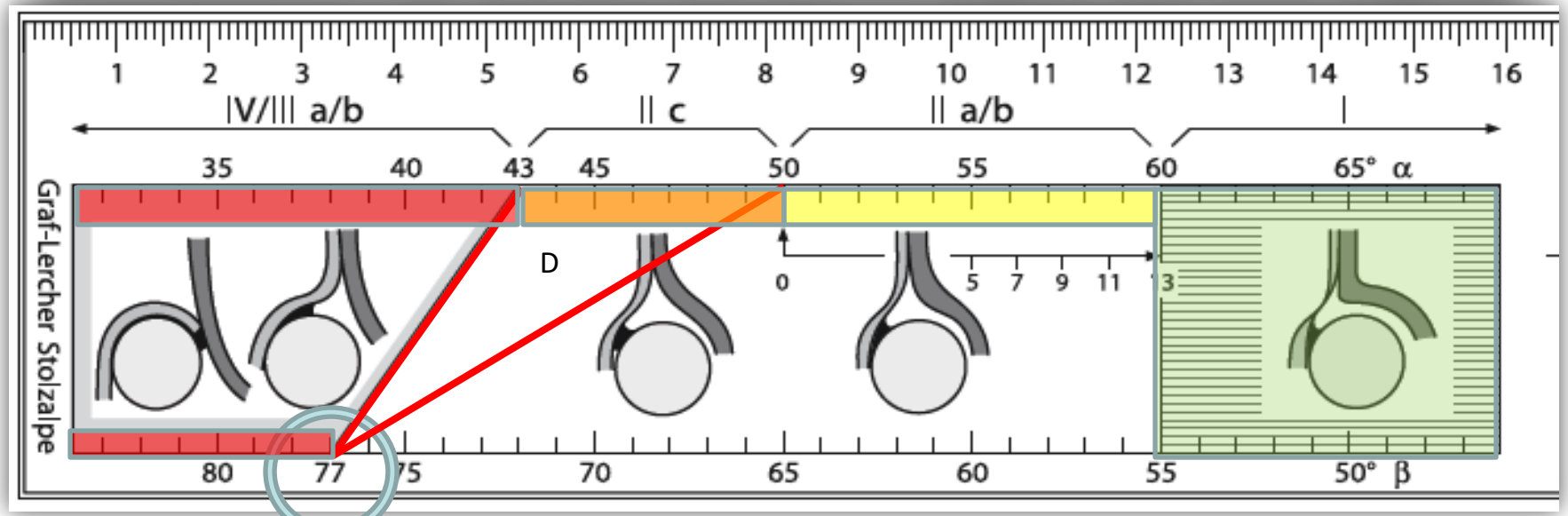
- ***Subclassification:***
- Type IIa – Alpha angle 50-59 degrees, child under 12 weeks – immature hip
- Type IIb – Alpha angle 50-59 degrees, child over 12 weeks -dysplastic hip.
- Type IIc – Alpha angle 43-49 degrees any age dysplastic hip



TYPE IIC v TYPE D

- Type IIc – poor bony coverage – head may move out of socket
- Cranial displacement – no change in alpha angle; beta angle increases.
- Alpha angle 43 – 49 degrees; Beta angle > 77 degrees – Type D

ULTRASOUND MEASUREMENT (alpha and beta angles)



Decentered (III,IV, D)

Unstable (IIc)

Immature II a
Dysplastic IIb

Normal type I

?