The Neonatal Lower Extremity Exam

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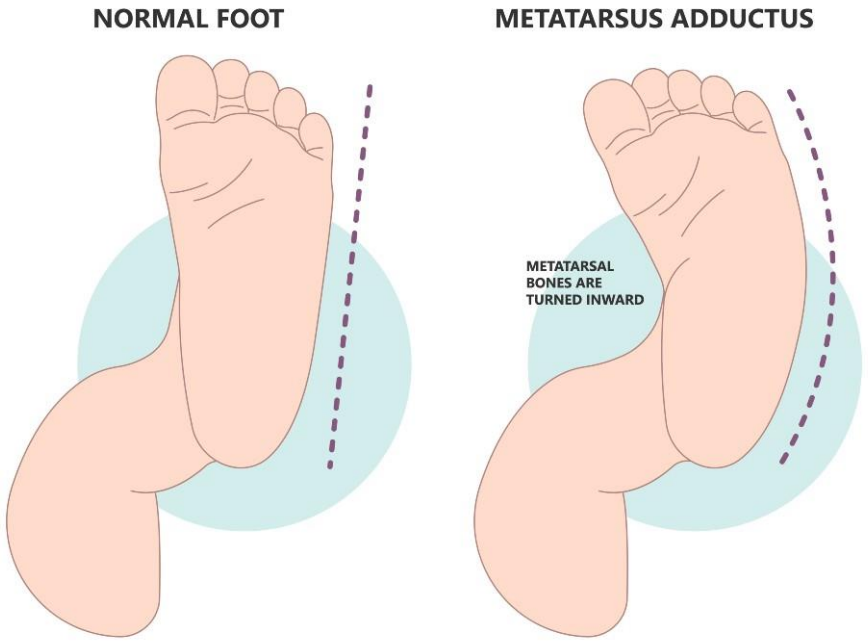
Lower Extremity Topics

- Congenital foot deformities
  - Metatarsus Adductus
  - Calcaneovalgus
  - Clubfoot
  - Congenital Vertical Talus
- Limb deficiency
  - Tibial Hemimelia
  - Fibular Hemimelia
- Congenital knee dislocation
- Tibial Bowing
- Developmental Dysplasia of the Hip

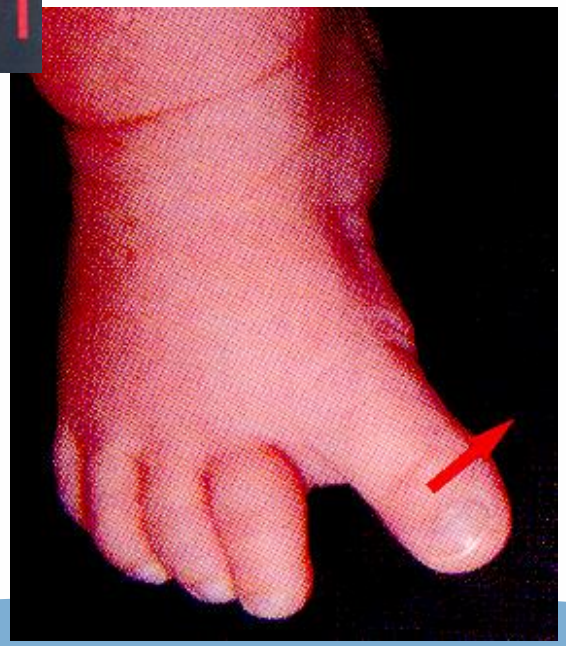
Metatarsus Adductus

- Curvature of lateral border of foot
- “Bean shaped foot”
- Normal hindfoot
- Common “packaging problem”
- Associated with hip dysplasia, so make sure to examine the hips



Forefoot Adductus

- Flexible (“metatarsus adductus”)
  - Resolve spontaneously
- Rigid (“metatarsus varus”)
  - May need serial casting and/or reverse last shoes
- Great toe abduction
  - Resolves spontaneously (over activity of great toe abductor)



Calcaneal Valgus Foot Deformity

- Hindfoot in both calcaneal and valgus
- A common packaging problem billed as a “possible clubfoot”
- Differentiate from vertical talus
- Flexible and usually resolves spontaneously
- Hip exam to rule out DDH

Congenital Vertical Talus

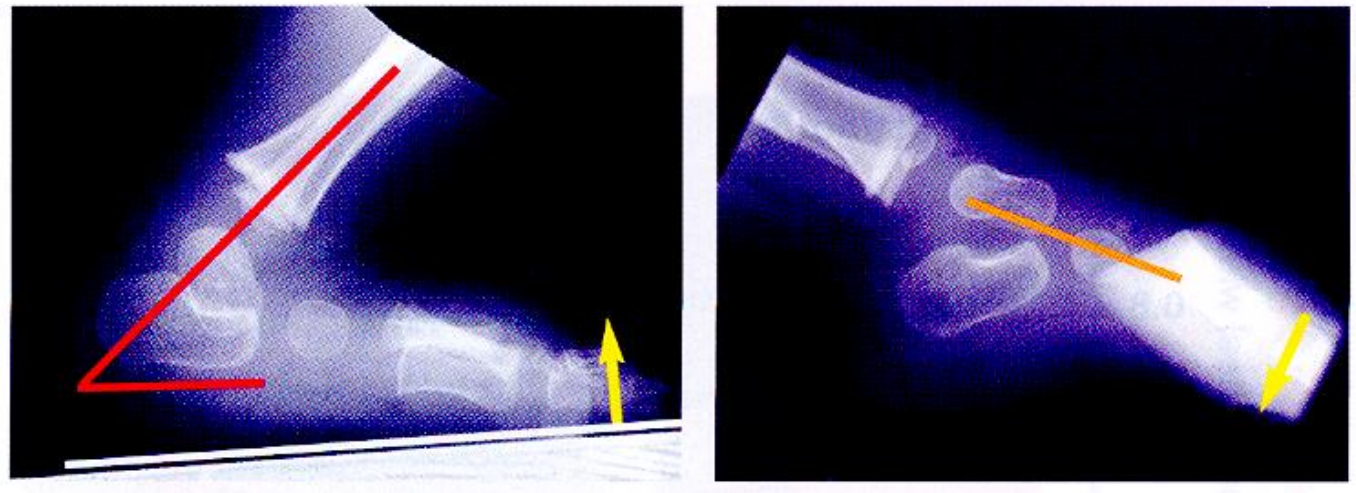
- Most severe congenital flatfoot causing convexity of the sole of foot
- Associated with other conditions (myelo, arthrogryposis)

Vertical Talus

- Clinically foot is stiff with head of talus projecting plantar, hindfoot in equinus

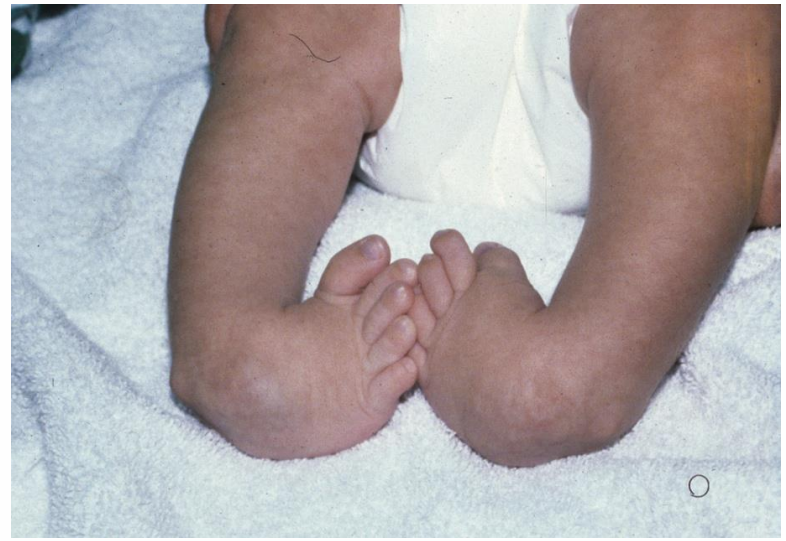
Congenital Vertical Talus

- Differentiate from congenital oblique talus with lateral dorsiflexion and plantarflexion X-rays.
- Management-reverse Ponseti casting with soft tissue release and pinning of TN joint



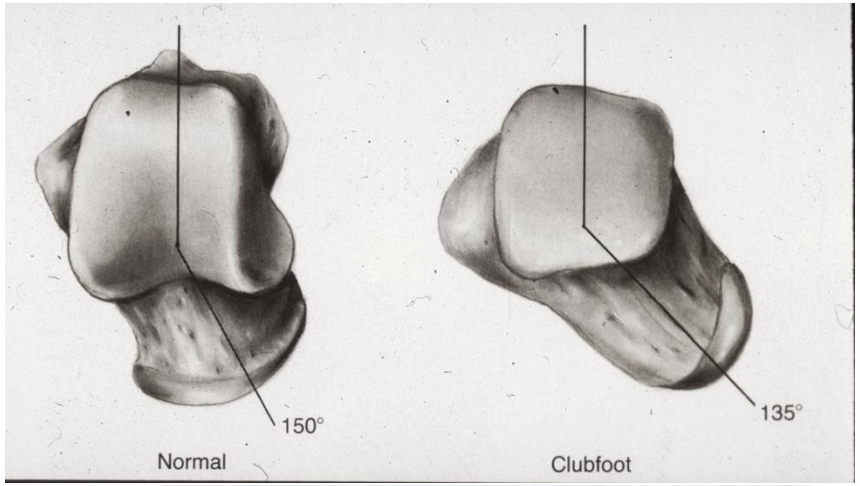
Clubfoot (Talipes equinovarus-TEV)

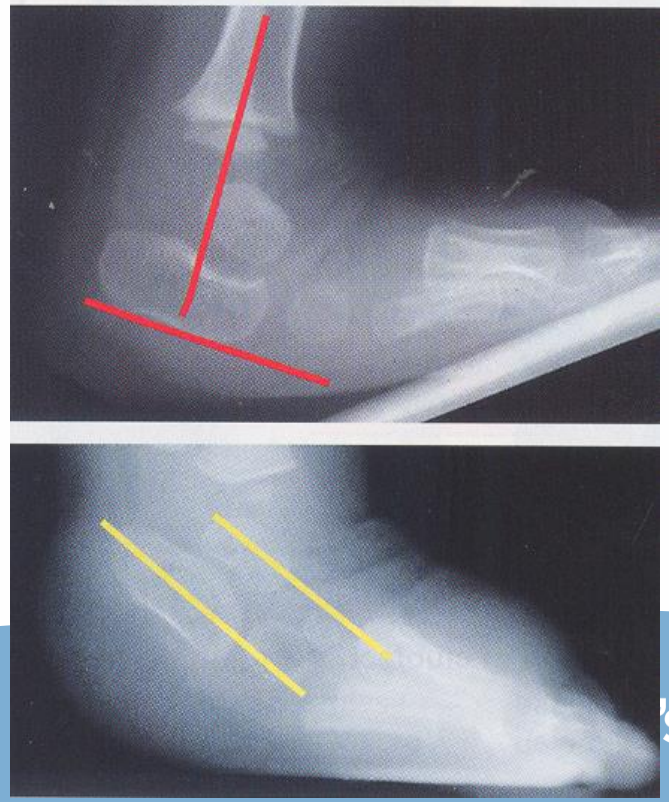
- Complex deformity that includes hindfoot equinus & varus, midfoot cavus, forefoot adductus, and often internal tibial torsion
  - 1/1000
  - 50 % Bilateral
  - M > F
- 30 X more frequent in offspring of affected families
- Can be symptom of myelo, CP, Larsen's syndrome, arthrogryposis



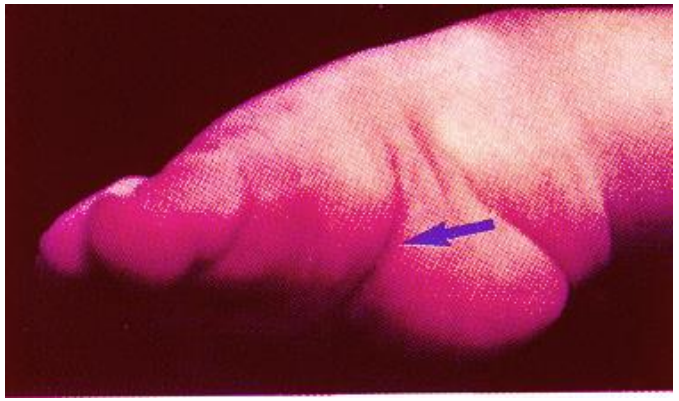
Pathology

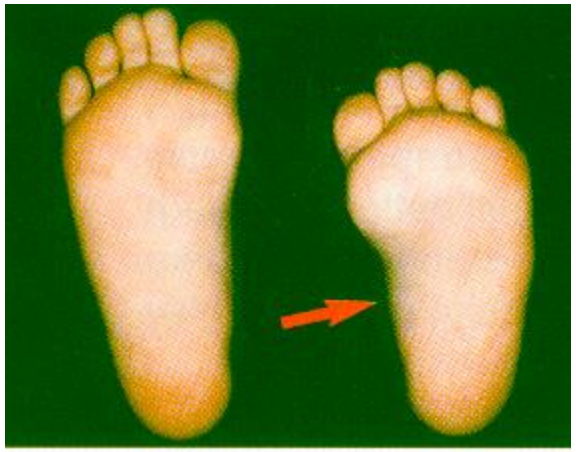
- Tarsals Hypoplastic
- Talus most deformed
  - Talar neck deviated medial and plantar flexed
- Navicular articulates with medial malleolus (pseudojoint)
- Talus and Calcaneus parallel
- Ligament/tendons contracted
- Muscles hypoplastic





Clinical Exam

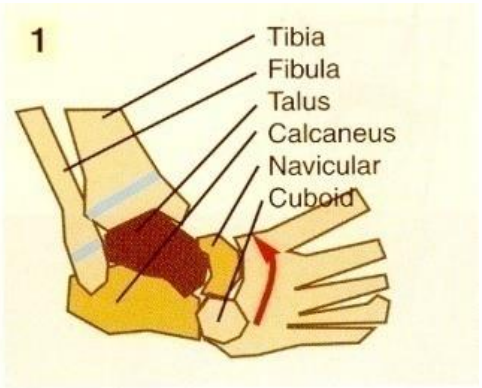


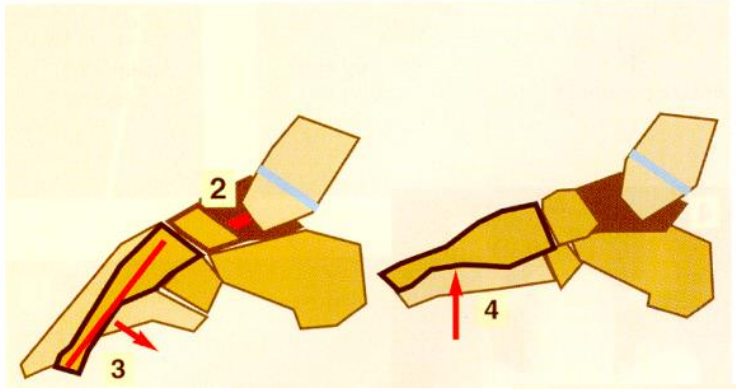


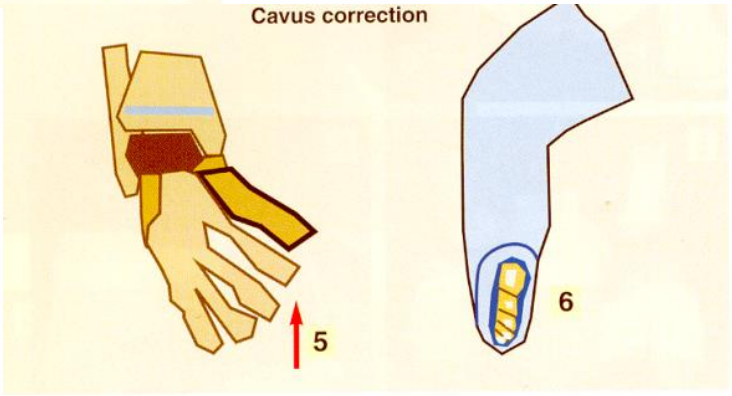
Ponseti Method

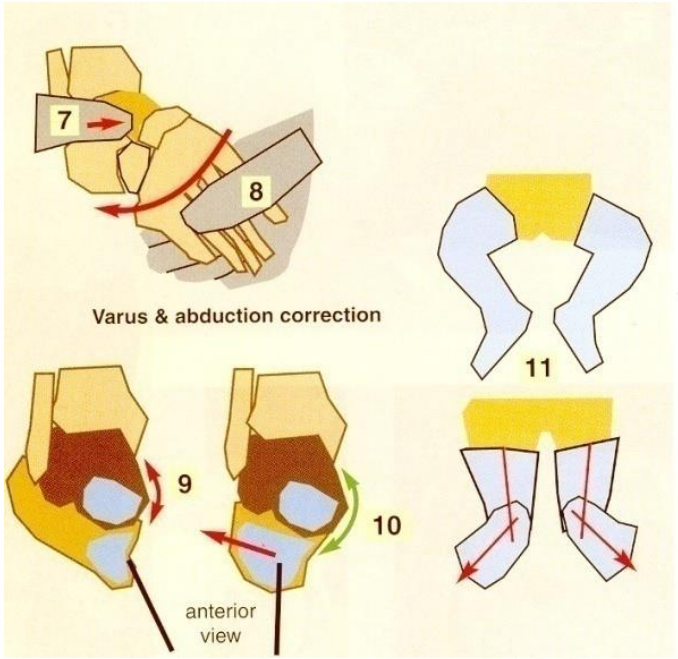
- Serial casting to correct cavus, rotate foot from under talus, and lastly correct equinus
- Percutaneous heel cord tenotomy
- Bracing (Dobbs bar and Ponseti sandals)
- 30% of patients require another procedure
  - Repeat TAL
  - Tibialis anterior tendon transfer

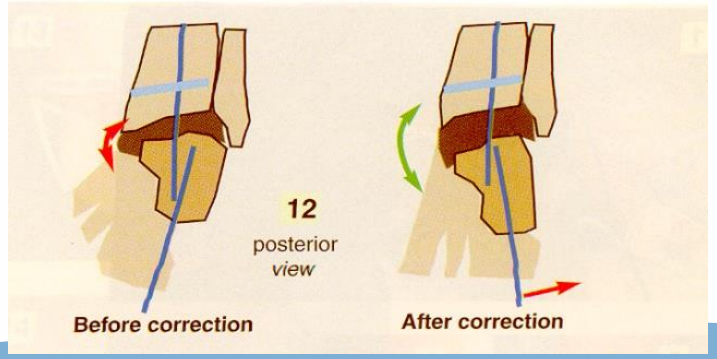
Ponseti Technique











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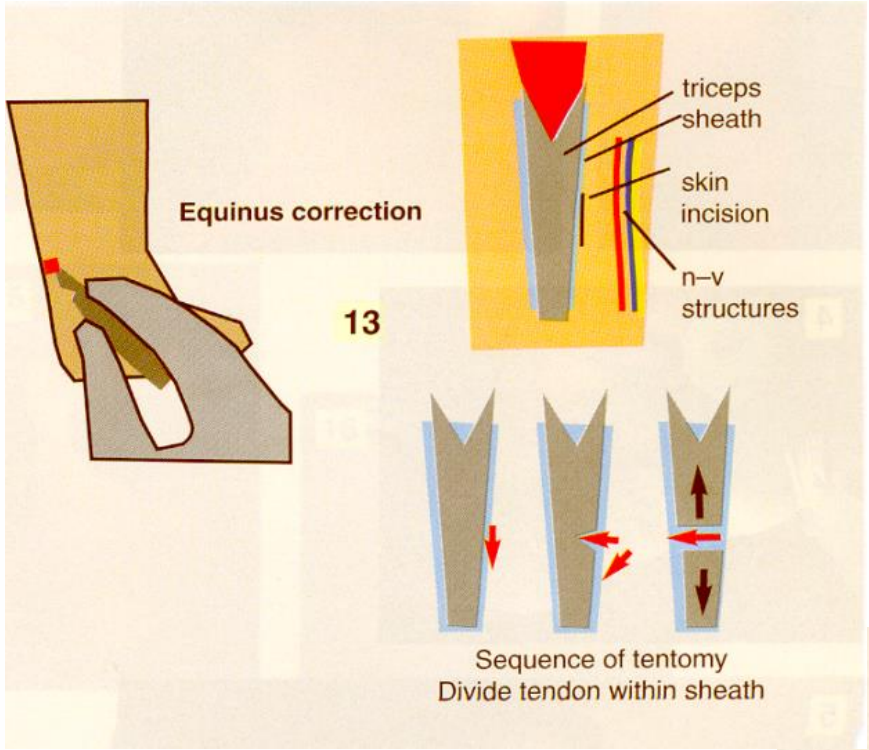
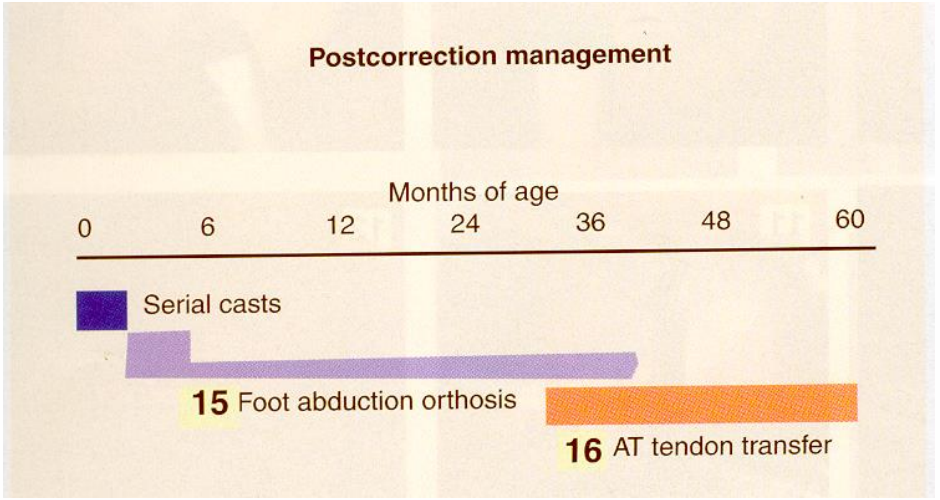
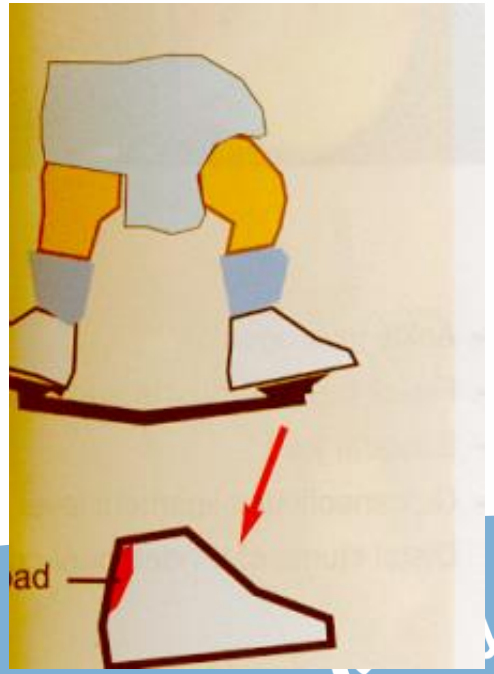
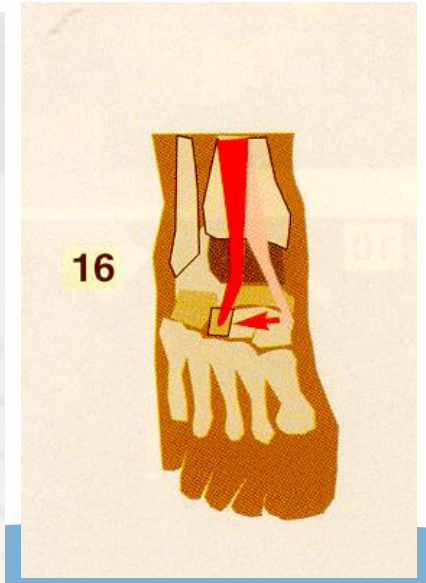

Equinus correction
triceps sheath
skin incision
n–v structures
13
Sequence of tentomy
Divide tendon within sheath


Postcorrection management
Months of age
0
6
12
24
36
48
60
Serial casts
15 Foot abduction orthosis
16 AT tendon transfer


14

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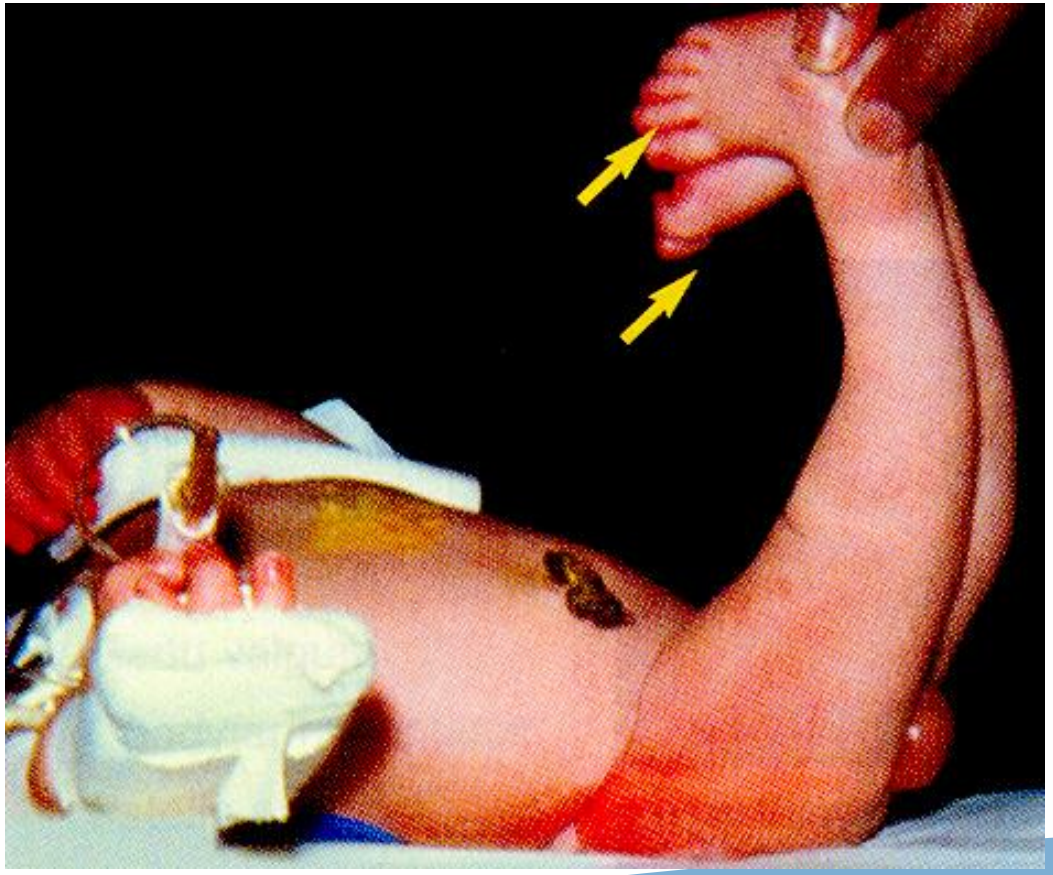
Congenital Knee Hyperextension



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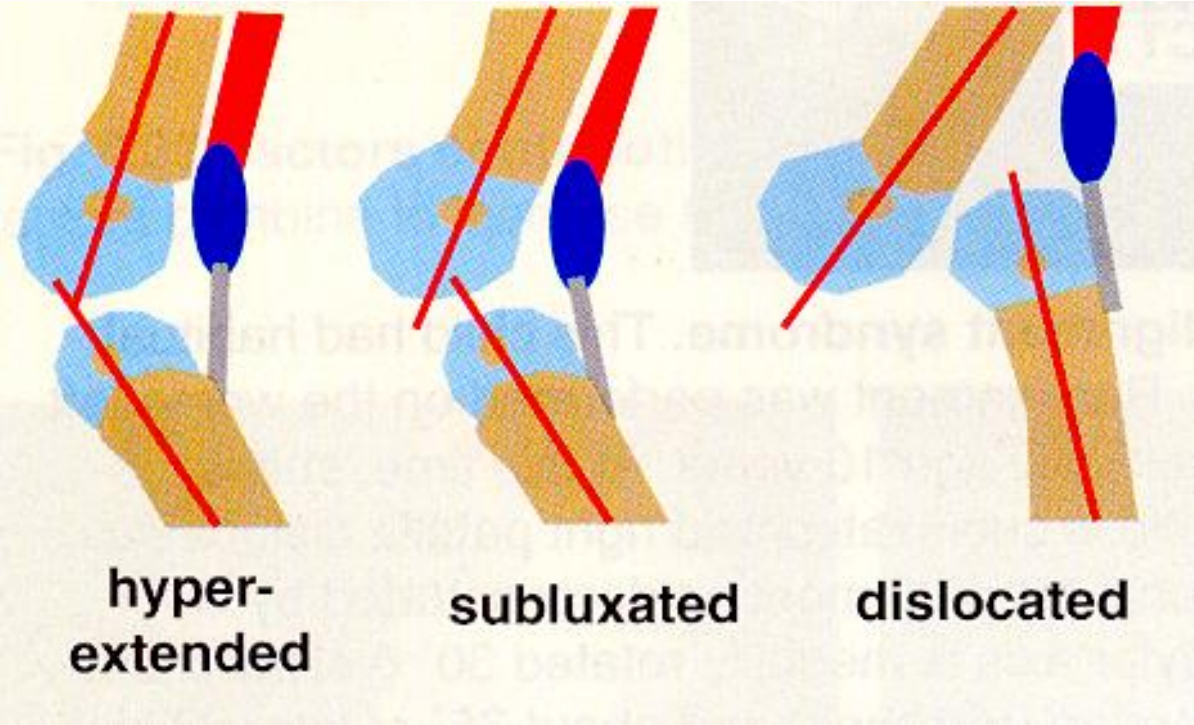
Classification of Extension Deformities



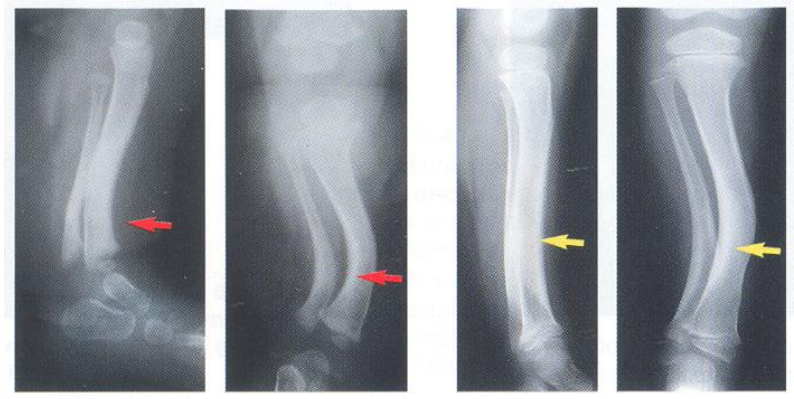
- Long leg casting to aid in reduction of the tibia on the femoral condyles
- May require a quadriceps tendon tenotomy or lengthening in complex cases
- Goal of casting is to get tibia to engage with the femur to allow the tibia to rotate around the axis of the distal femur

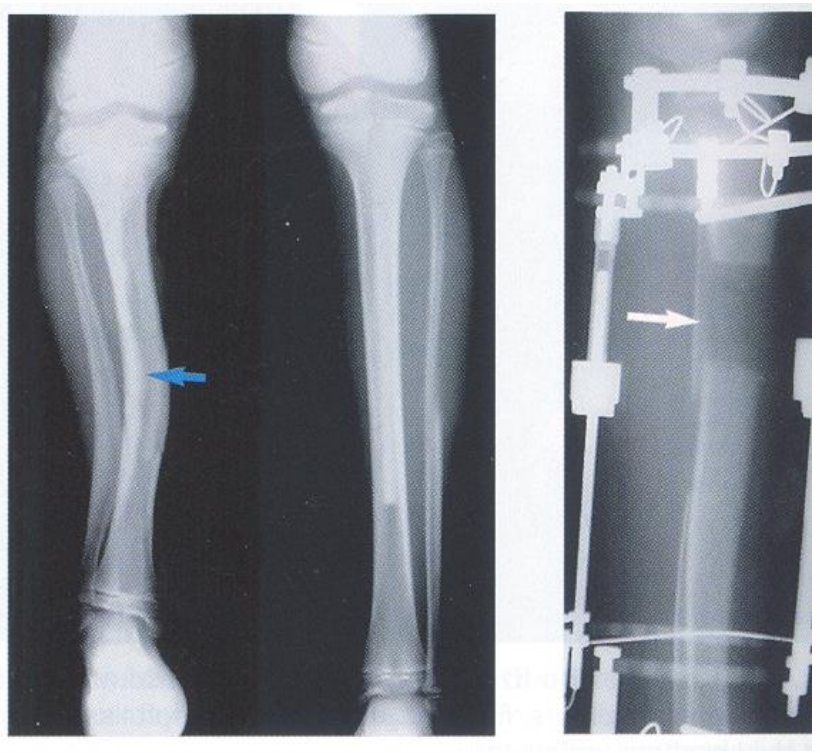
Congenital Tibial Deformity

- Types
  - Physiologic bowing
  - Posteromedial tibial bowing
  - Anterolateral tibial bowing

Congenital Tibial Deformity

- Posteromedial tibial bowing
  - Bowing resolves with growth
  - Associated Calcaneal deformity resolves
  - Associated limb length inequality (2.0-4.0 cm)
  - May need epiphysiodesis or limb lengthening





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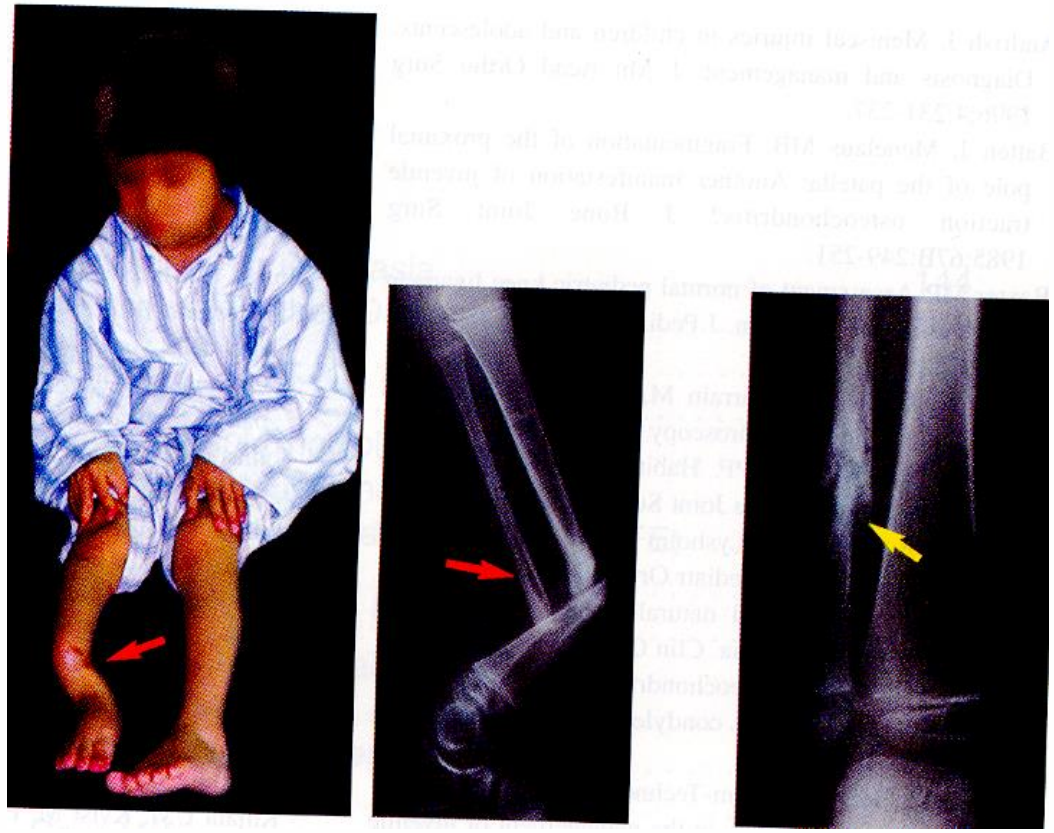
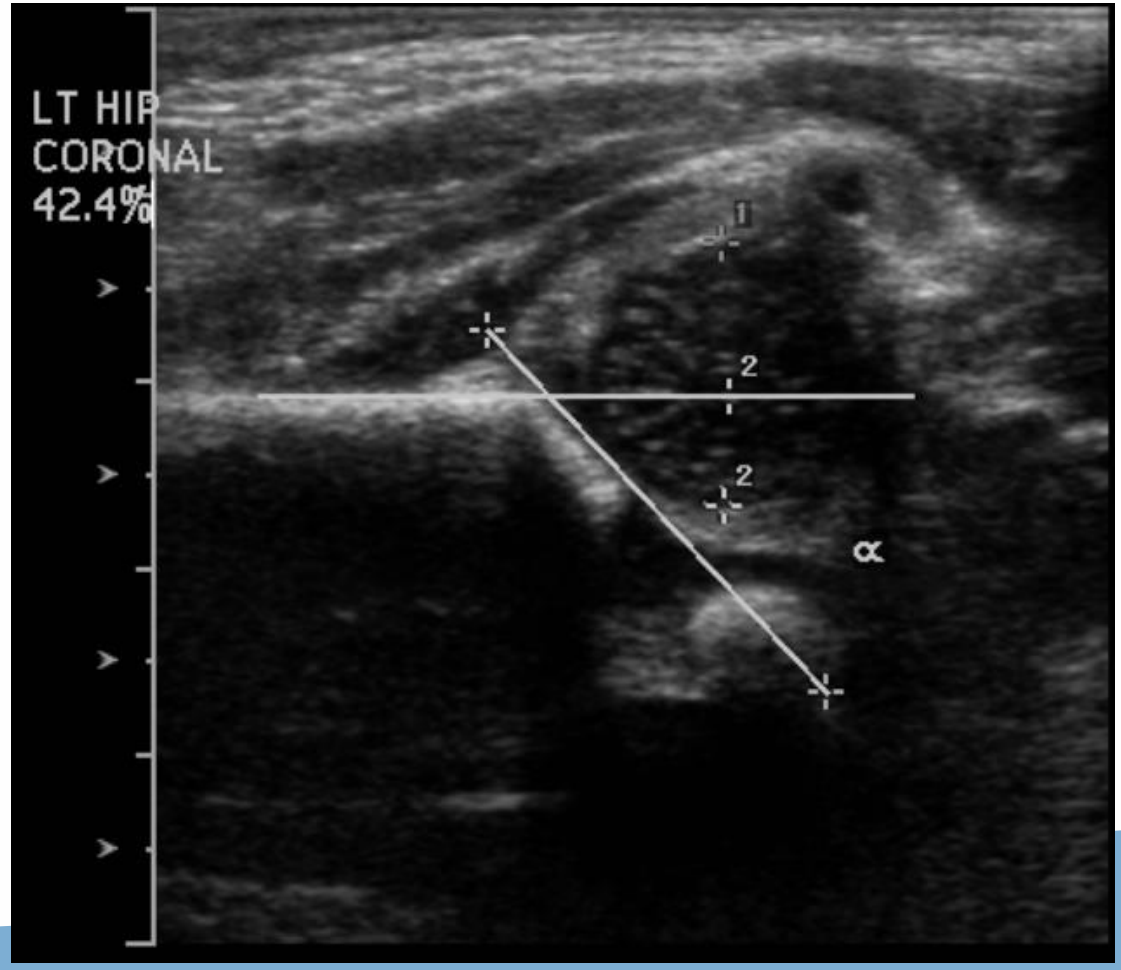
Congenital Tibial Deformity

- Anterolateral Tibial Bowing
  - Serious form of bowing
  - May develop pseudoarthrosis
  - Very difficult to manage
  - Association with Neurofibromatosis



Developmental Dysplasia of the Hip



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Etiologic Factors

Mechanical Factors

Prenatal
- Breech
- Olioghydramnios
- Primigravida
- Congenital Knee Recarvatum
- Congenital Muscular Torticollis
- Metatarsus Adductus, Calcaneal Valgus

Postnatal
- Traditional Swaddling
- Strapping

Physiologic Factors
- Familial Hypermobility
- Maternal Hormones-Relaxin

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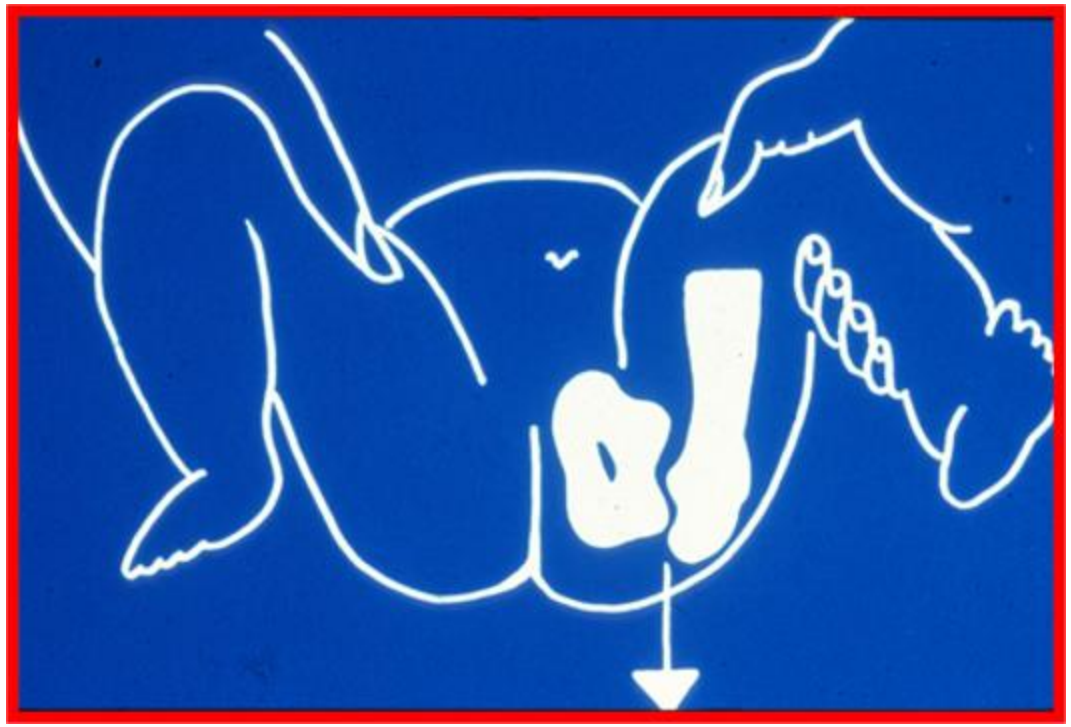
The Continuum of Disease in DDH

- Dysplastic on ultrasound without physical exam findings
- Dysplastic on ultrasound with physical exam findings
  - Subluxatable (9.2/1000)
  - Dislocatable (1.3/1000)
  - Dislocated/Relocatable (1.2/1000)
- Teratologic Dislocation

Barlow Maneuver

- Is the hip dislocatable?
- Barlow-adduction/push maneuver to dislocate the hip
- With hand around the knee, and fingers on the greater trochanter, adduct and push posteriorly at the knee the proximal femur
- A clunk indicates the hip is dislocated

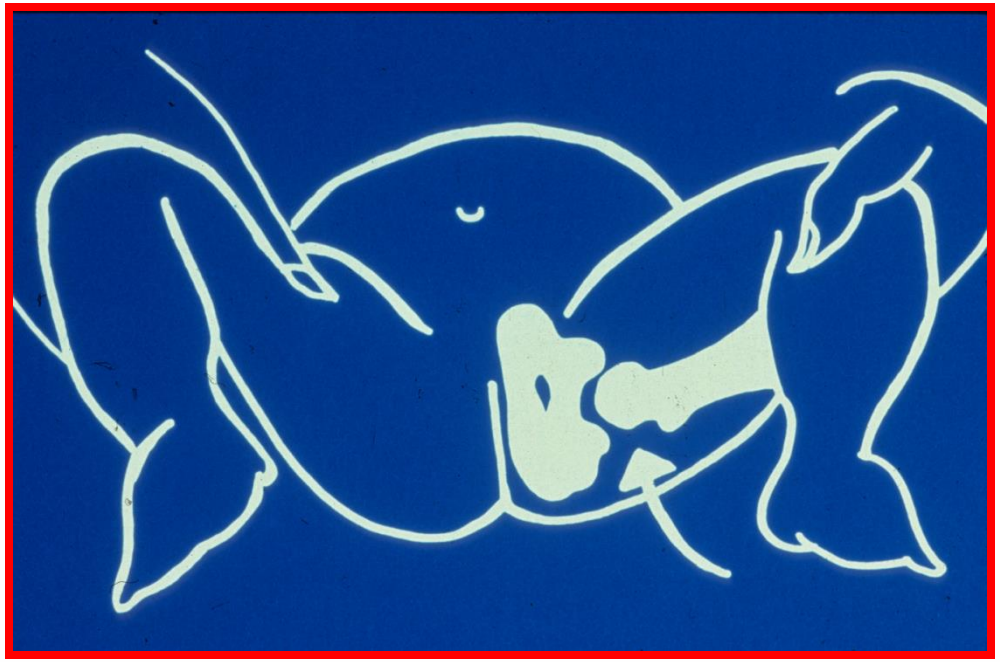
Barlow Maneuver

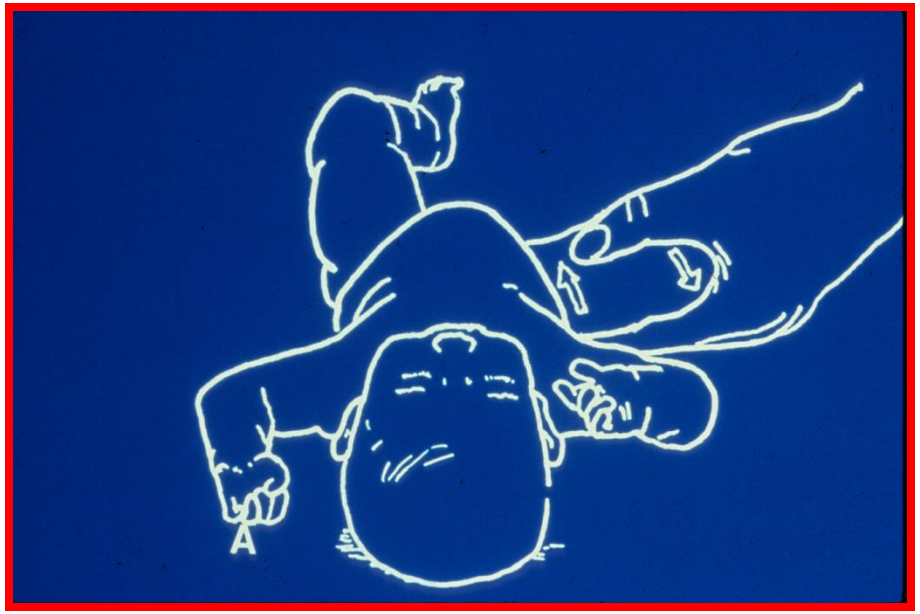


Ortolani Maneuver

- Is the hip reducible?
- Ortolani-abduction/elevation maneuver to relocate a dislocated hip
- With hand around the knee, and fingers on the greater trochanter, abduct and lift the proximal femur
- A clunk indicates the hip is relocated
- Ortolani becomes negative > 3 mos as the hip becomes too tight to relocate

Ortolani Maneuver





Developmental Dysplasia of the Hip

- Galeazzi test-shortened appearance of femur due to hip dislocation
- Asymmetric thigh folds alone have not been shown to be the sole indicator of a dislocated hip, but can accompany other findings
- Limitation in hip abduction is a later finding in DDH secondary to a high riding femoral head

Later Hip Dislocation Physical Exam

- Hip Flexion Contracture
- Pistoning
- Wide Perineal Space
- Prominent greater trochanters
- Lumbar Lordosis
- Waddling Gait
- Broad Flat Buttocks

Ultrasound in DDH

Advantages

- More sensitive than clinical exam
- Dynamic exam that measures instability in real time
- Safe, noninvasive imaging technique

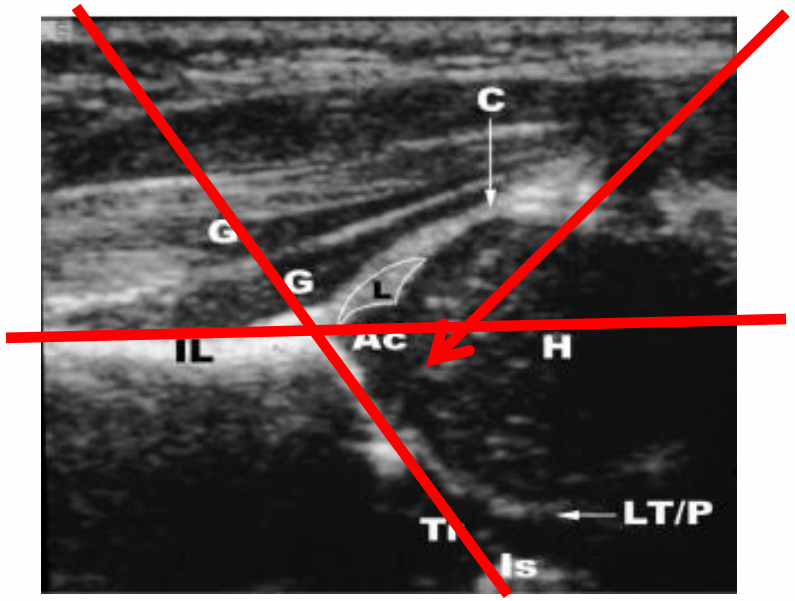
Disadvantages

- Cost
- Cannot differentiate between immaturity and early DDH

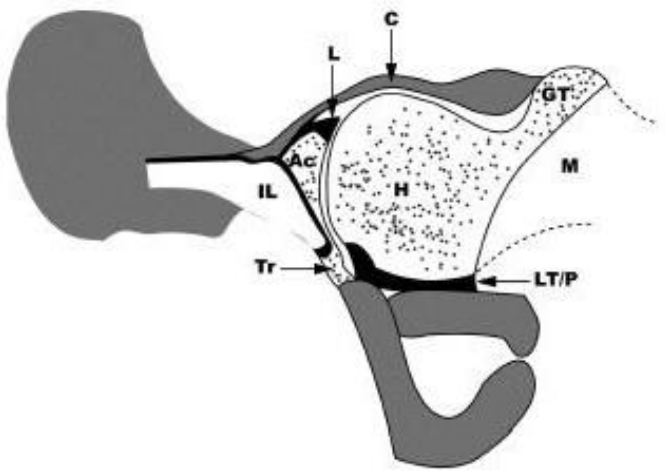
Recommendations for Ultrasound in DDH

- All infants with abnormal findings in clinical exam
- Monitor treatment of unstable hips
- Neonates with normal exam but “risk factors” should be screened at 4-6 weeks of age
- Equivocal findings or hip click at 4-6 weeks

DDH-ultrasound findings



- α (alpha) angle- angle between ilium and acetabulum on <u>coronal</u> ultrasound; goal is 60 degrees
- Femoral head coverage goal is >50%



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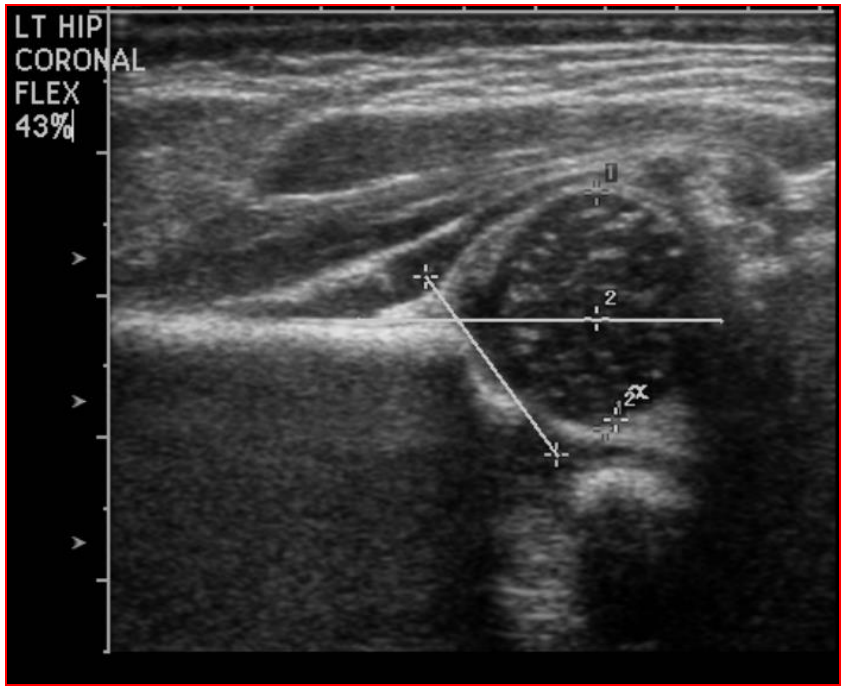
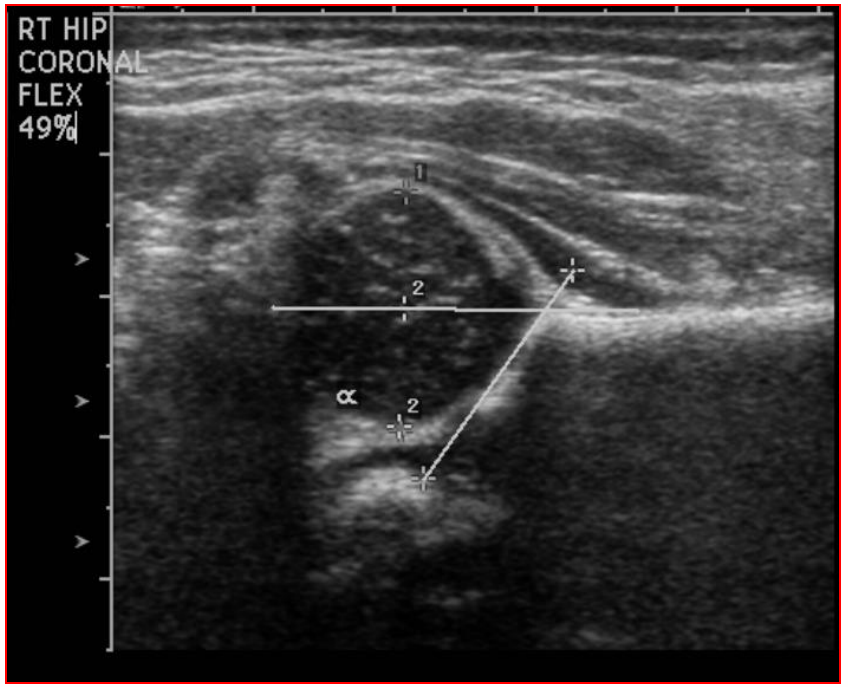
Immature Hip





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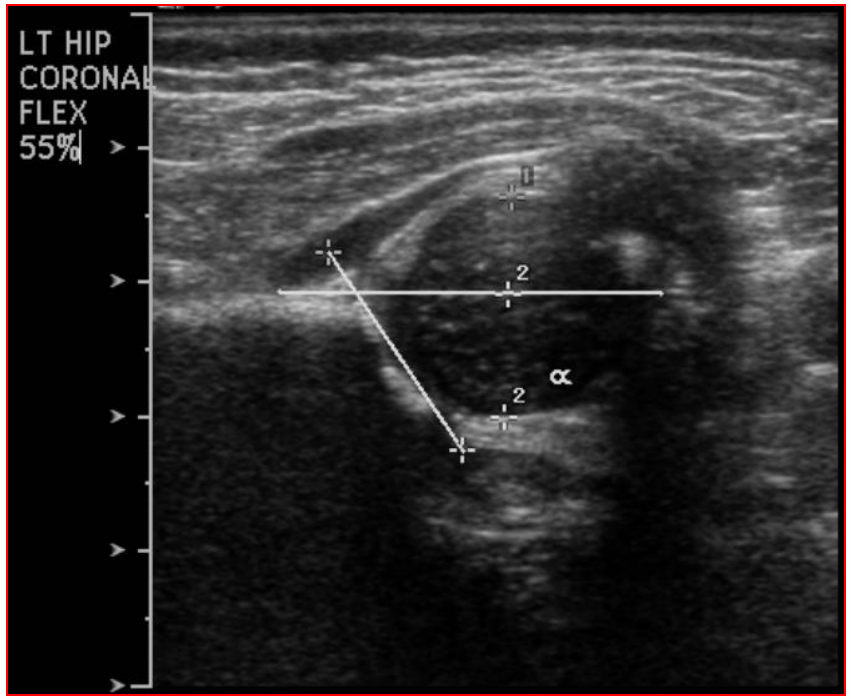
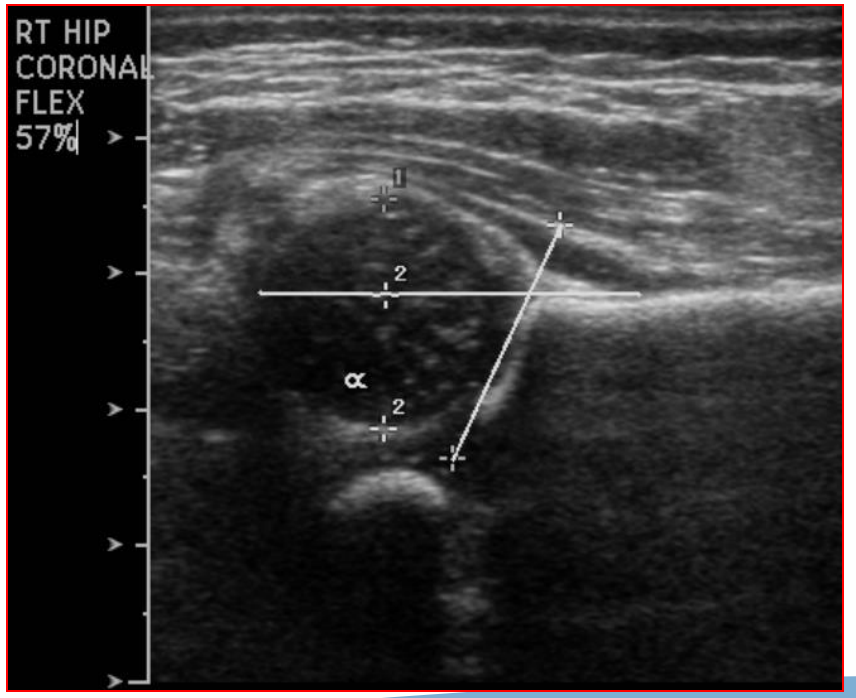
Immature Hip

4 weeks of observation





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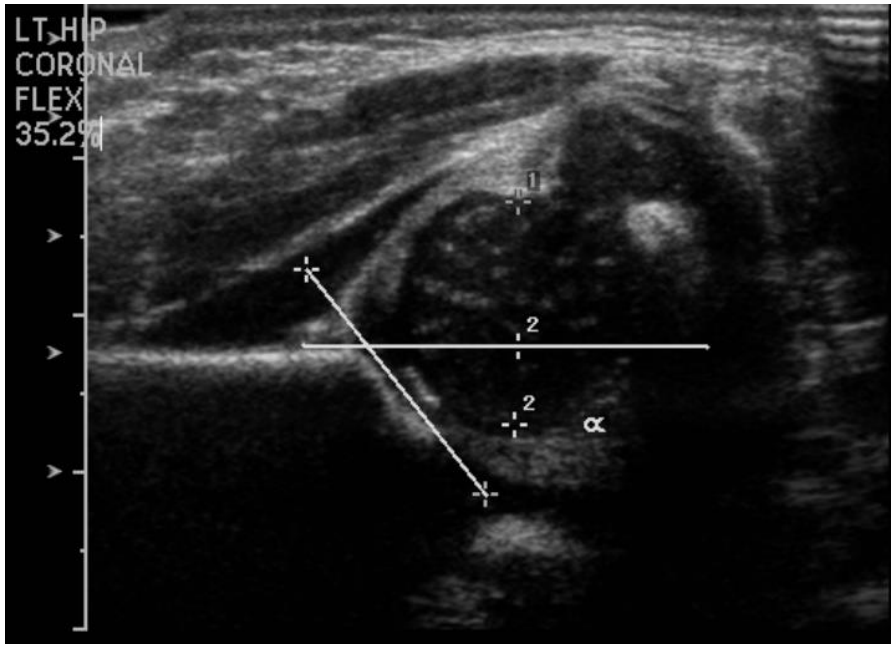
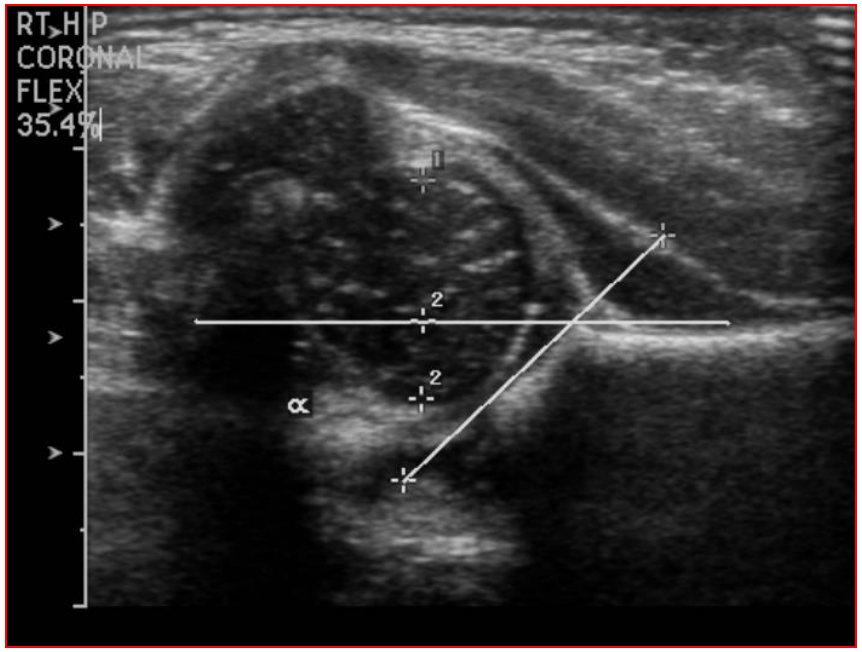
Unstable Hip





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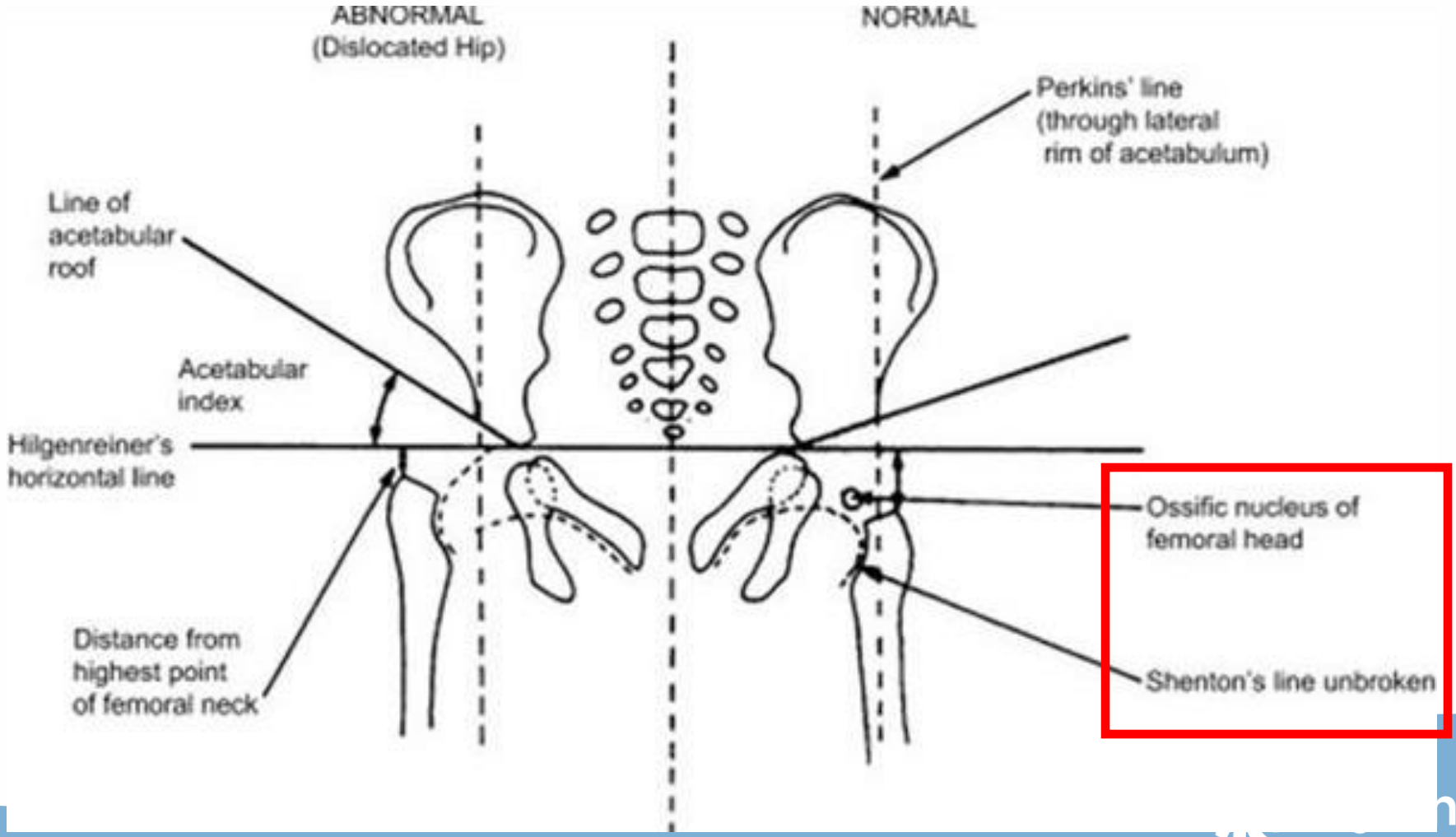
Developmental Dysplasia of the Hip

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DDH Treatment

- Treatment-early intervention!
- Pavlik Harness-places hip in flexion and abduction to allow for good femoral head positioning in the acetabulum
- 12 weeks wear-6 full time, 6 nights and naps

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