



Steele- cut of all three bones- more rotational

DDH

- Acetabulum + prox femur + soft tissues (capsule, ligament teres,, transverse ligament, pulvinar)
- Prox femur- cartilaginous at birth.
- Leads to early OA

DDH Associations

- Congenital torticollis
- Breech presentation - hip flexed and knee extended
- Left hip most common- cause newborns have this hip against mothers spine, limited abduction

PE

- Ortolani + Barlow (Barlow = bad)
- Test hip abduction
- Limb length discrepancy (galeazzi sign)



**Galeazzi  
Test**  
Difference  
in  
knee  
height

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## Imaging

- Ultrasound
- Alpha angle- ilium and osseous wall of acetabulum

Alpha angle  $< 60^\circ$ , hip may sublux

- Beta angle- ilium + cartilaginous labrum

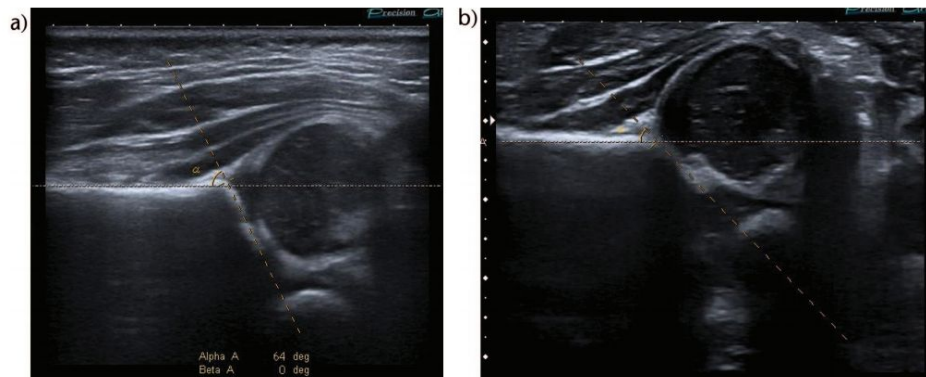


Fig. 1. (a) Normal sonography. (b) In contrast with (a), the  $\alpha$  angle is  $< 60^\circ$  and the hip is subluxated.

- Radiographs
  - Acetabular index - looks at acetabulum anatomy
  - Sharps angle

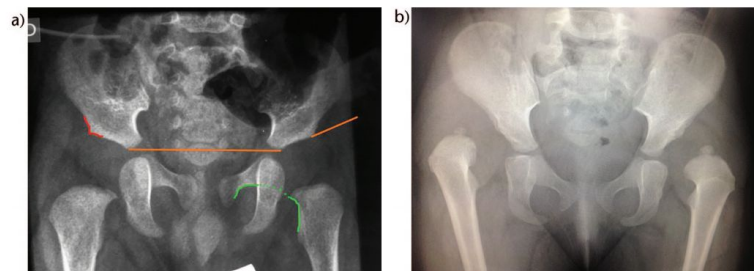


Fig. 2. (a) Radiograph studies are the reference in children older than 4 to 6 months of age. In the image, although the ossification nucleus of the head is absent, indirect signs of concentric reduction as the formed talus (red line) and Shenton line (green lines) are present. The acetabular index (orange line) is the main parameter to control acetabular development during the first years of age. (b) Bilateral dislocation of a two-year-old child.

○



## Treatment

- Goal= concentric stable reduction of femoral head to acetabulum
- Barlow + hips
  - observe for 4-6 weeks. 96% resolve within first 6 weeks of life
- Ortolani + Barlow pos-
  - if no improvement by 4-6 weeks, treat
- If femoral head dislocated- pavlik harness is used for reducing a dislocated/subluxed hip
  - Hip + knee flexion provokes abduction.
  - Harness not recommended in large kids, patients older 8 months
  - Hip should be reduced after harness. If not- stop harness- AVN
  - Excessive flexion- can lead to inferior dislocation or paralysis of femoral nerve
- IF pavlik failed or kids older than 6-8mo> closed/open reduction in OR followed by spica cast
  - Arthrogram may be used- can evaluate the soft tissues and see if hip is concentrically reduced
    - Well seated hip joint- won't have any pooling of radiopaque dye medially between femoral head/acetab
    - Dye pool <5 to 6mm is indication of good reduction
  - Cast in stable position- 90-100 flexion, abduction in safe zone, >55 abduction increases AVN risk
  - Post-op CT or MRI to assess concentric reduction
  - Reduce w/ flexion, abduction, and gentle traction
  - +/- adductor tenotomy
  - AVN can occur if hip is still dislocated
  - Once closed/open reduction achieved- spica cast x 3 months
- Open reduction
  - Goal: remove anatomic impediments to FA congruence
  - Anterior/medial approach
    - Ant- smith/petersen- reflect oblique muscles, split iliac apophysis, detach rectus femurs from AIIIS, open hip capsule, reduce + remove soft tissue, +/- capsulorrhaphy
    - Media- groin incision, release adductor longus, preserve medial fem circumflex, incise capsule, reduce hip



### Acetab dysplasia correction

- A stable concentric femoral head should normalize acetabulum development
- Acetabulum dysplasia increases w/ age of hip reduction
- Femoral osteotomy
  - Derotate femoral head and inc varus to stabilize and stimulate acetabulum development
  - It takes out some femoral anteversion. Shortens femur a little to dec pressure on acetabulum
- Acetabular osteotomies
  - Try in increase coverage of femoral head acting on acetabulum side
  - 3 groups-
  - Reorientation osteotomies (salter, triple osteotomy, periacetabular osteotomy-ganz)
    - Increase lateral/anterior coverage of femoral head
    - Salter osteotomy- cut thru both columns
    - Pemberton pericapsular osteotomy- uses triradiate cartilage as hinge. Improves acetabulum coverage. (Incomplete cut , doesn't require fixation).
    - Dega osteotomy- pericapsular osteotomy- improves lateral coverage
  - Volume reducing osteotomies- Dega/San Diego, Pemberton
  - Salvage osteotomy- (chiari, shelf)

### Sources

Vaquero-Picado, A., González-Morán, G., Garay, E. G., & Moraleda, L. (2019). Developmental dysplasia of the hip: update of management. *EFORT open reviews*, 4(9), 548-556.

Murphy, R. F., & Kim, Y. J. (2016). Surgical management of pediatric developmental dysplasia of the hip. *Journal of the American Academy of Orthopaedic Surgeons*, 24(9), 615-624.