Developmental Dysplasia of the Hip

Fifth Year Lecture – Orthopedic Surgery

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Objectives

- Definition Of DDH / Spectrum Of Disease
- Epidemiology And Risk Factors
- Clinical Presentations According To The Age
- Explanation If Barlow And Ortolani And Galeazzi Tests
- Explanation Of Trendelenburg Gait
- X-ray Signs In DDH
- Imaging Roles In DDH
- Management According To The Age

Developmental Dysplasia of the Hip

Introduction

Abnormal development resulting dysplasia , subluxation or dislocation of the hip

- DDH spectrum includes

1. Dysplasia … a shallow / underdeveloped acetabulum
2. Subluxation
3. Dislocation

Epidemiology

- incidence
  - most common orthopedic disorder in newborns
  - dysplasia is 1:100
  - dislocation is 1:1000
- location
  - left hips / females
  - bilateral 20%
- risk factors
  - first born
  - female 6:1 males
  - family history
  - Fetal malposition/breech/oligohydramnios

Pathophysiology

- Instability caused by
  1. maternal hormones → relaxin
  2. genetic laxity
  3. intrauterine and postnatal mispositioning

  - instability → dysplasia → dislocation

Presentation

< 3 months of age

- hip subluxation/dislocation palpable on exam
- **Barlow test** .. dislocates a dislocatable hip by adduction and depression of the flexed femur
- **Ortolani test** .. reduces a dislocated hip by elevation and abduction of the flexed femur
- **Galeazzi** .. limb length discrepancy with hip and knee flexed at 90 degrees
- Barlow and Ortolani a rarely positive after 3 months of age

Ortolani and Barlow tests

Ortolani and Barlow tests

Classification

1. **Dislocated**
   - Ortolani-positive early when reducible; Ortolani-negative late when irreducible
2. **Dislocatable**
   - Barlow-positive

Galeazzi sign

Presentation

> 3 months of age

- limitations in hip abduction → contractures begins .
  - Symmetrically limitation in bilateral dislocations
  - Unilateral limitation in unliteral dislocation
- Galeazzi … leg length discrepancy positive in unilateral

Presentation

> 1 year - walking child

- **Unilateral dislocation**
  - pelvic obliquity
  - Trendelenburg gait ….. results from abductor insufficiency
  - toe walking ….compensate for shortening of affected side

- **bilateral dislocations**
  - lumbar lordosis and waddling gait

Trendelenburg gait

Imaging in DDH

1- Hilgenreiner's line

- horizontal line through right and left triradiate cartilage
- femoral head ossification should be inferior to this line
- Dislocated hip if its located above this line

Imaging in DDH

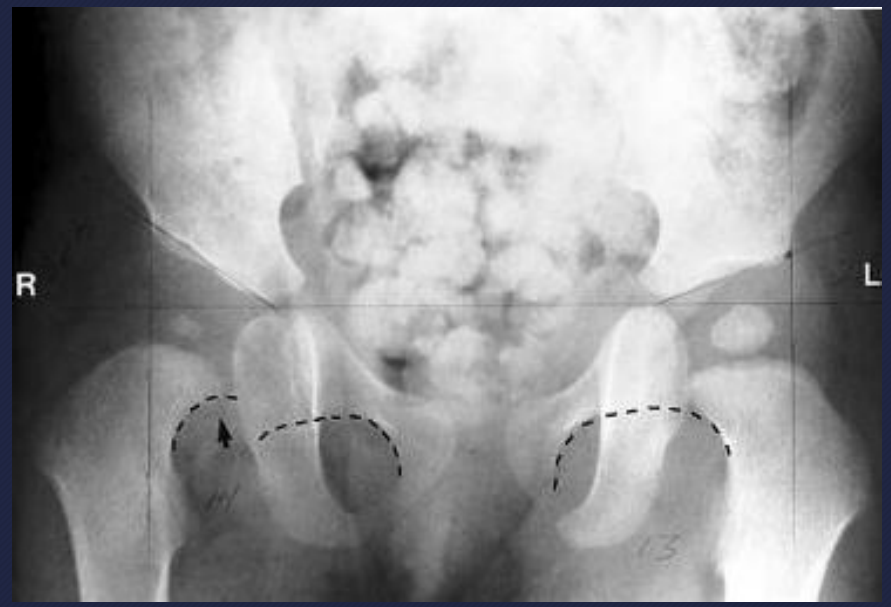
2- Perkin's line

- line perpendicular line to Hilgenreiner's through a point at lateral margin of acetabulum
- femoral head ossification should be medial to this line
- If femoral head located lateral to this line its dislocated

Imaging in DDH

3- Shenton's line

- arc along inferior border of femoral neck and superior margin of obturator foramen
- arc line should be continuous
- If its broken then the hip dislocated



4- delayed ossification of femoral

head .. is seen in cases of dislocation

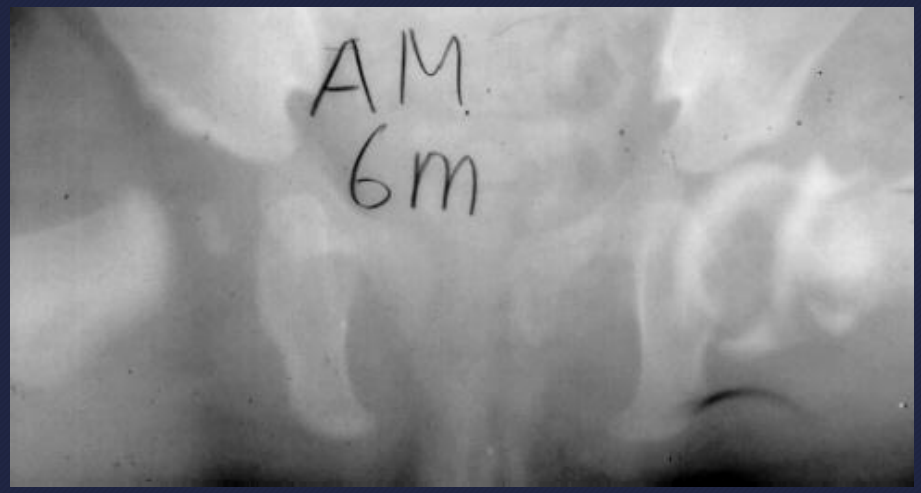
Other imaging in DDH

Ultrasound

- useful before femoral head ossification <4-6 months
- not cost effective for routine screening

Arthrogram

used to confirm reduction during closed reduction under anesthesia



CT:

study of choice to evaluate reduction of the hip after closed reduction and spica casting

Management of **DDH < 6 months of age**

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By abduction splinting/bracing (Pavlik harness)

- a dynamic splint … requires muscle function for successful outcomes
- Pavlik harness success rate of 90%
- Bracing position is 90-100° flexion (by anterior straps) and abduction of 50° (by posterior straps)
- worn for 23 hours/day for 6 weeks or until hip is stable
- wean out over 6-8 weeks until normal anatomy develops
- Monitor with ultrasound or x-ray and every 4-6 week
- Stop pavlik harness if not successful after 3-4 weeks

DDH in 6 - 18 months of age or failure of pavlic harness

- **closed reduction and spica casting**
- adductor tenotomy performed
- Closed reduction under general anesthesia
- arthrogram to confirm reduction intraoperatively
- immobilize in a spica cast
  - hip flexion of 100 deg.
  - abduction of 45 deg
  - neutral rotation for 3 months

- confirm reduction with CT scan in spica cast

DDH in patient >18 months of age or failure of closed reduction

- open reduction and spica casting
  - remove possible anatomic blocks to reduction
  - Capsulorrhaphy
  - Spica Casting immobilization in functional position of 15° of flexion, 15° of abduction and neutral rotation

DDH > 2 years

- **open reduction plus femoral osteotomy**
- **+- Pelvic osteotomy**

Complications

- **Osteonecrosis** : in all forms of treatment
  - excessive or forceful abduction
  - repeat surgery

- **Delayed diagnosis**

  bilateral dislocations : patients typically functions better if hips are not reduced 6 years of age or older

  unilateral dislocation better outcomes without surgical treatment if patient is 8 years of age or older

- **Recurrence - 10 %**
- **Transient femoral nerve palsy : s**

  seen with excessive flexion during Pavlik bracing

Best wishes ….