Developmental Dysplasia of the Hip

Fifth year lecture – orthopedic

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Developmental Dysplasia of the Hip

Introduction

Abnormal development resulting dysplasia , subluxation or dislocation of the hip

DDH spectrum includes •

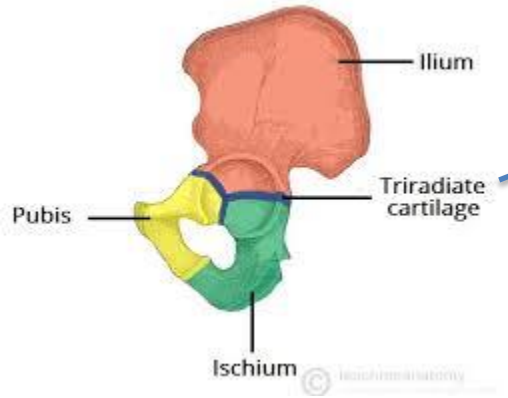
1. Dysplasia (simple) … a shallow / underdeveloped acetabulum
2. Subluxation (moderate)
3. Dislocation (severe)

Developmental is not congenital , it is ongoing process. >> up to 2.5 years,
During this period ,, if there is abnormal hip should discovered early and treated
Early > everything will resolved >> otherwise > simple dysplasia up to dislocation
May occur.
Dysplasia ; (abnormal formation) of acetabulum > abnormal shape
>> is not concave enough to accommodate for the femoral head
Sublaxation (partial loss of contact between two articular surface)

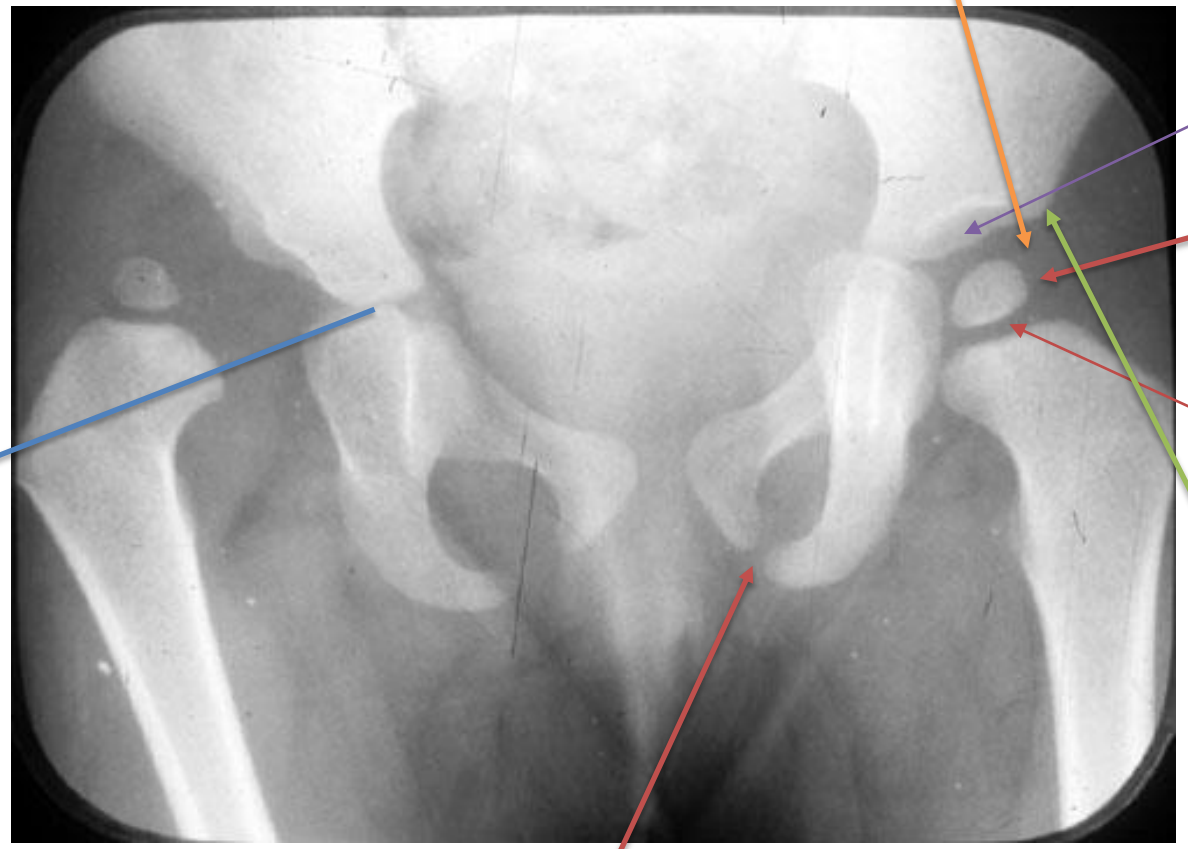
Adduction is the
position of dislocation of abnormal hip.
So, when treat the patient we try to do
abduction \\ المهاد may predispose dislocation
Because it induce adduction specially in abnormal hip.

Newborn baby
normal position
Flexion& abduction
Of hip joint\ اما بل مهاد
Make him adduction
And extension

This child
Does not has
Risk of DDH



Cartilage of acetabulum
femoral head is radiolucent



Cartilage of
Acetabulum
And femoral head

Ossification Center, which
Can not be seen
Below 4 months
So, do ultrasound
To confirm dx.

Growth plate
Of neck

Lateral margin
Of acetabulum

Growth plate of pubis

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
  - female 6:1 males
  - family history
  - Fetal malposition/breech/oligohydramnios (abnormal strain of joint with intrauterine life)

Pathophysiology

- Instability caused by
  1. maternal hormones → relaxin (secreted by placenta in last trimester relaxing the birth canal>> relaxation of joint capsule)
  2. genetic laxity (family history) .
  3. intrauterine and postnatal mispositioning(breech presentation و مهاد الطفل > exacerbate dysplasia)

  – instability → dysplasia → dislocation

Presentation

< 3 months of age

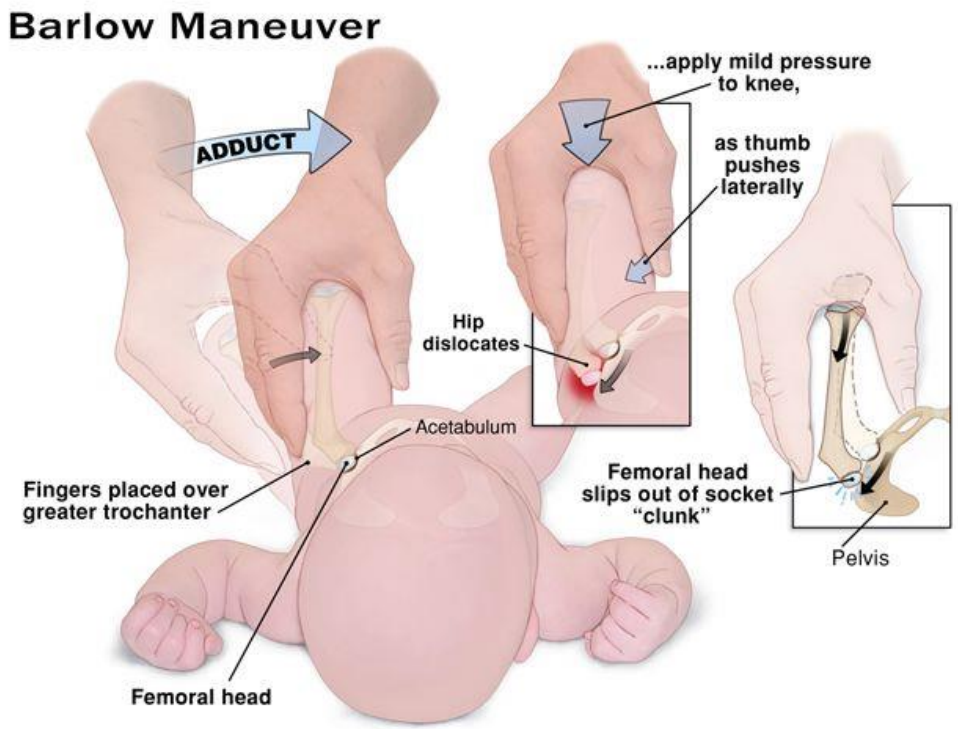
- hip subluxation/dislocation palpable on exam
- **Barlow test** .. dislocates a dislocatable hip by adduction and depression of the flexed femur
- **Ortolani test** .. reduces a dislocated hip by elevation and abduction of the flexed femur
- **Galeazzi** .. limb length discrepancy with hip and knee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

Barlow test

we inducing dislocation – it is impossible to do dislocate normal hip – so this test used to see if the hip stable(impossible to dislocated) or unstable (will dislocated) by certain maneuver (flexion of both hips in 90 degree > force addaction ; both knees meet together in the midline then we push backward) ,, two posabilities:

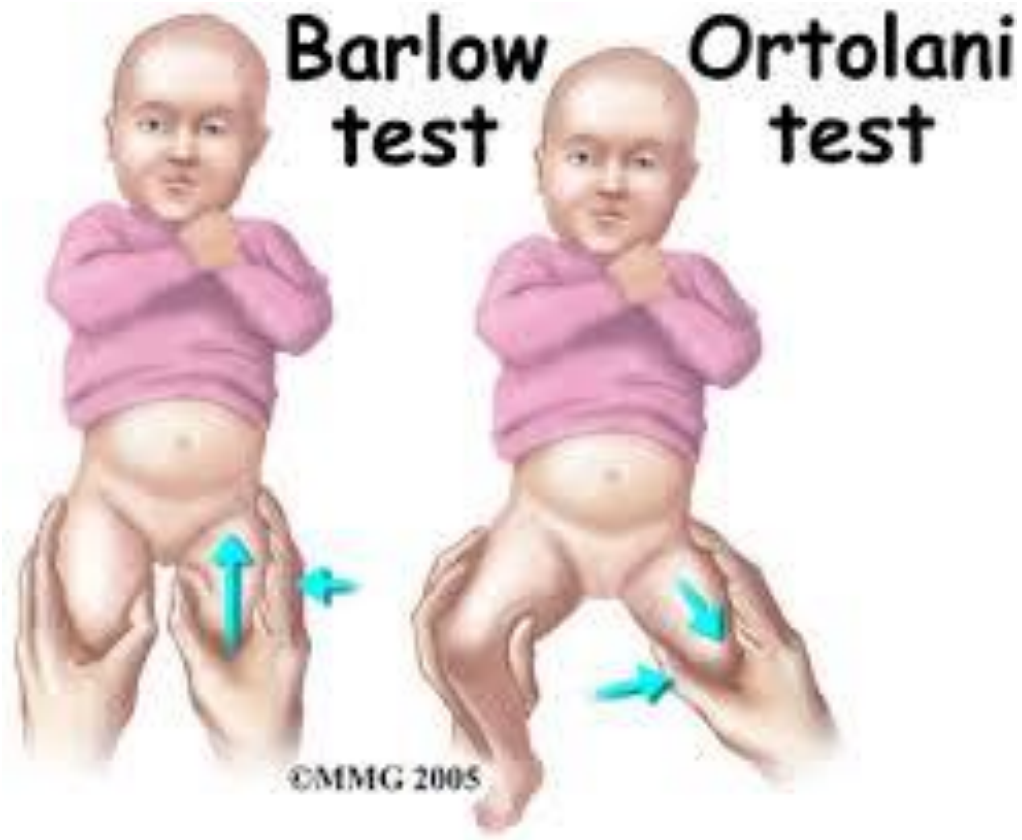
Either (+) when dislocation occur , feel or hear click

Or (-) when nothing occur .



<u>Ortolani test</u> we keep the hip flexed 90 degree then we do abduction and elevation of femoral head by using The long finger over the trochanter and push forward .. 2 possibilities occur ;

+ a) either the hip is already dislocated , then we will hear or feel click of reduction.
- b) or the hip is stable (nothing will occur)



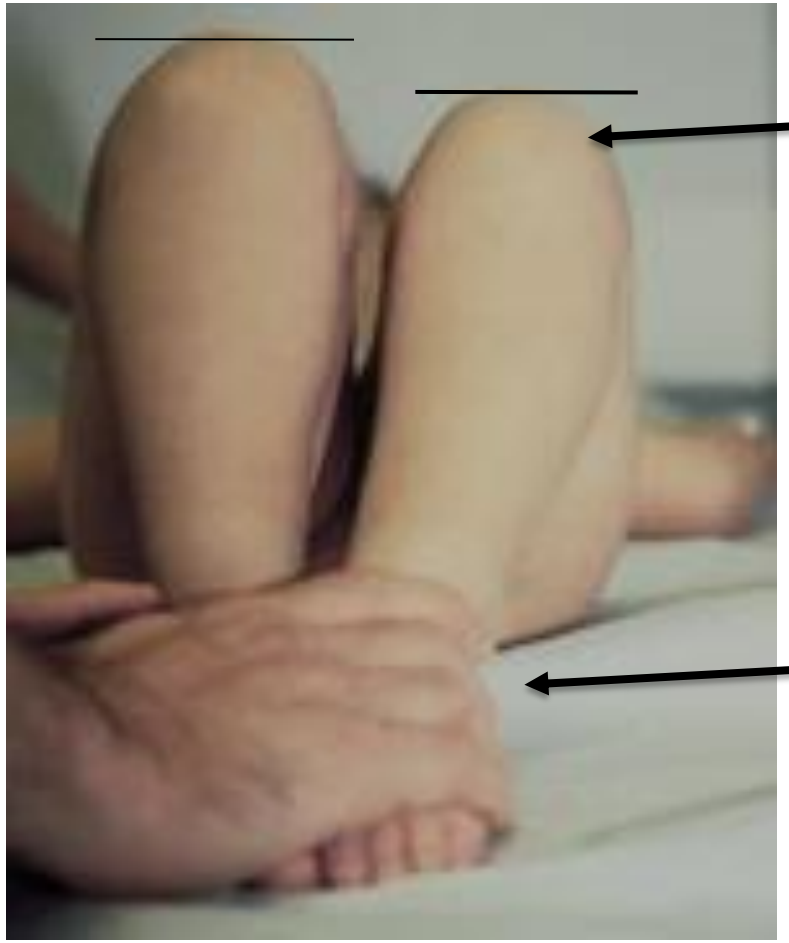
- When barlow (-) and ortolani (-) hip is normal
- When barlow (-) but ortolani (+) hip is already dislocated
- When both are ++ (dysplasia or sublaxation) mean that the hip is so laxated that we can dislocate it and bring it back easily.

Ortolani and Barlow tests

Ortolani and Barlow tests

Galeazzi sign

Benefit in unilateral dislocation
Not benefit in bilateral



dislocated

At same level

Classification

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

Presentation

> 3 months of age (contracted capsule and muscle strong due to long abnormal position of dislocated hip)

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

Presentation

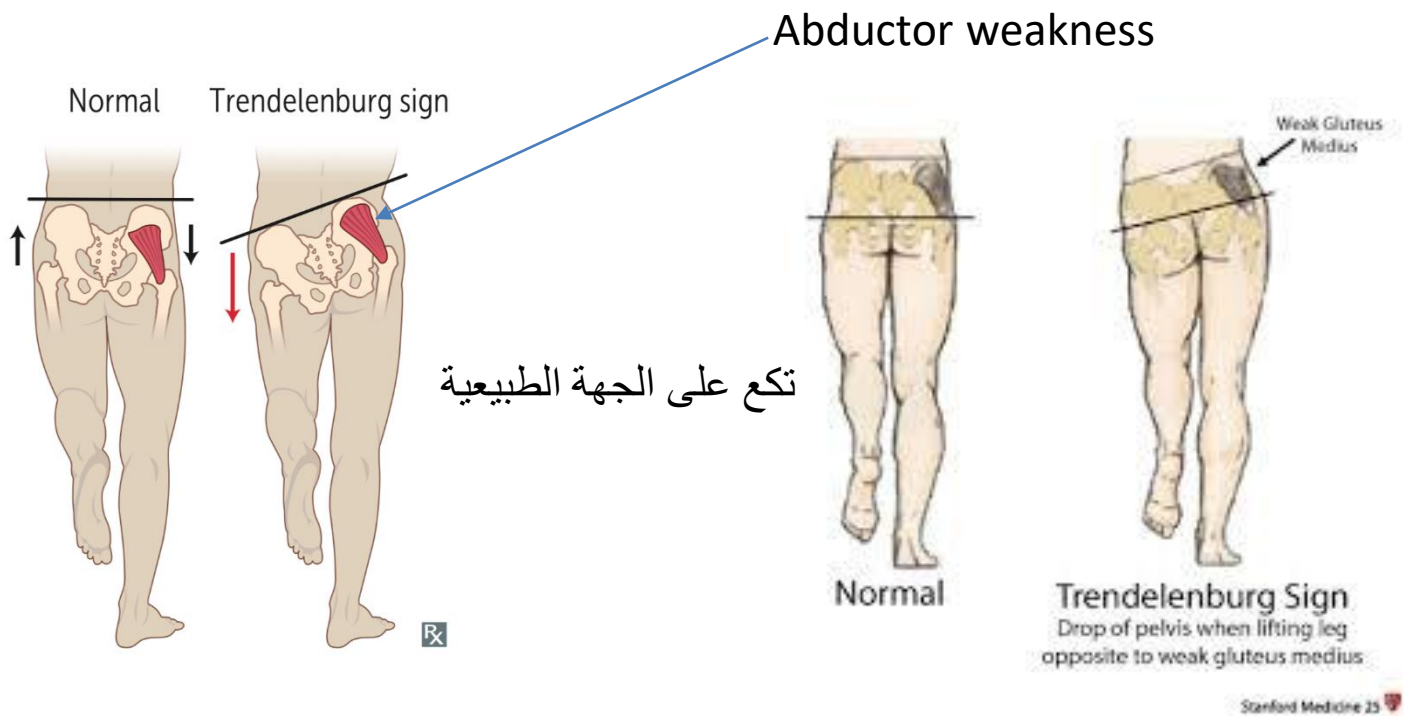
> 1 year - walking child

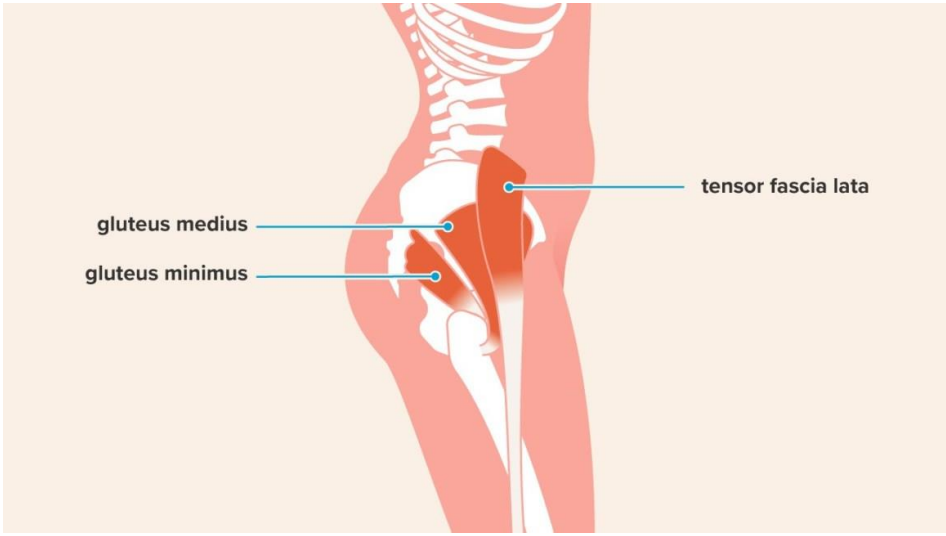
- **Unilateral dislocation**
  - pelvic obliquity
  - Trendelenburg gait ….. results from abductor insufficiency
  - toe walking ….compensate for shortening of affected side

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

Trendelenburg gait : is an abnormal gait (as with walking) caused by weakness of the abductor muscles of the lower limb, gluteus medius and gluteus minimus and tensor facia lata.
-in weak muscle , hip dislocation , painful hip

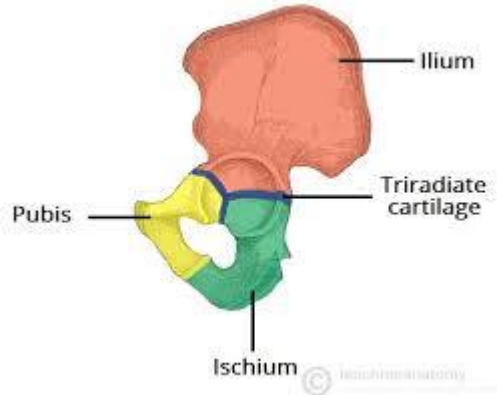
-Abductor muscles contracted in ipsilateral stand limb to carrying the body weight
On one limb ((when asking the patient to stand on one limb.))
- If patient stand on affected side > body fall on other normal side.
- If bilateral weakness in abductor (waddling gait)





Trendelenburg gait

Radiological features in DDH



1- Hilgenreiner's line

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

Ossification center not obvious (it is below 4months)

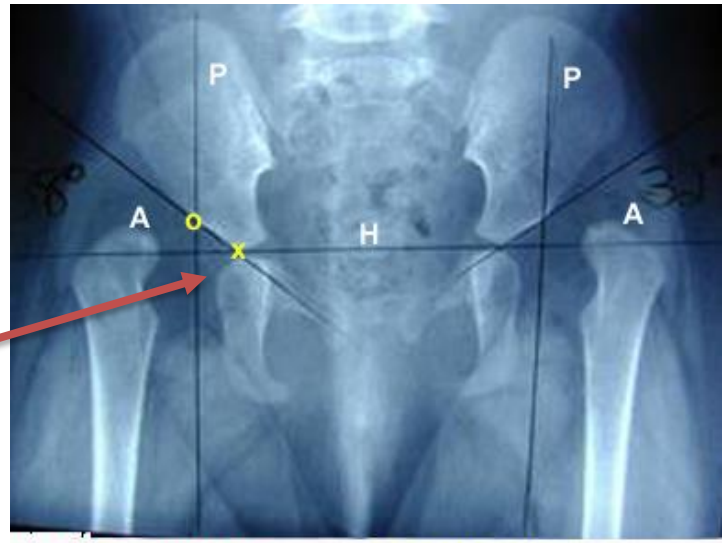
Here it is bilateral dislocation
Head above hilgenreiner's line

Radiological features 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

If we divide the side into
Four quadrants:
Head of femur should be in
The infermoedial quadrant



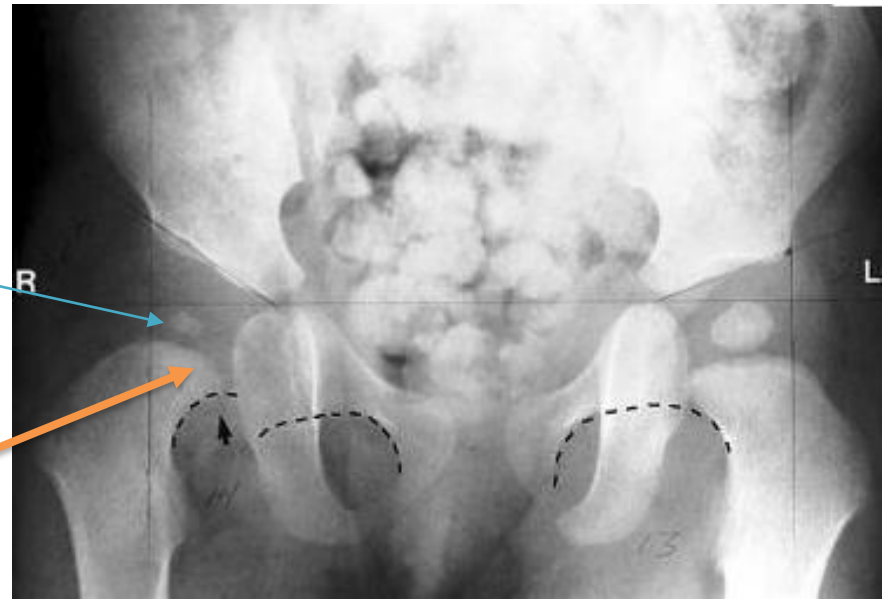
Radiological features in DDH

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



This head of femur
Is in inferomedial
Quadrant but it has
Broken shenton's line
So it is sublaxated

Other imaging in DDH

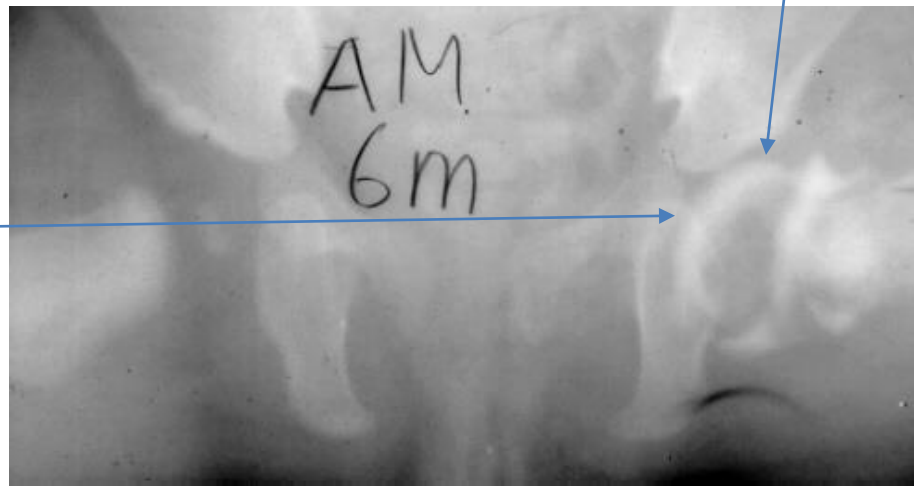
Ultrasound

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

Arthrogram

used to confirm reduction during closed reduction under anesthesia

Injection of radio-opaque material on joint (cartilage head)



CT:

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

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

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° flexion (by anterior straps) and abduction of 45° (by posterior straps) preventing the baby from doing unwanted extension or adduction

  like مهاد so , it limit the movement partially leaving the bone in favorable position.
- worn for 23 hours/day for 6 weeks or until hip is stable (re-assessment by barlow\ortolani)
- 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 when **re-assessment still lax.**

Normal position
Of newborn.

- Use of pavlik harness if the barlaw (+) and\or Ortolani (+) but can not be used if both are negative and Galeazzi sign (+) mean it is unreducable.

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

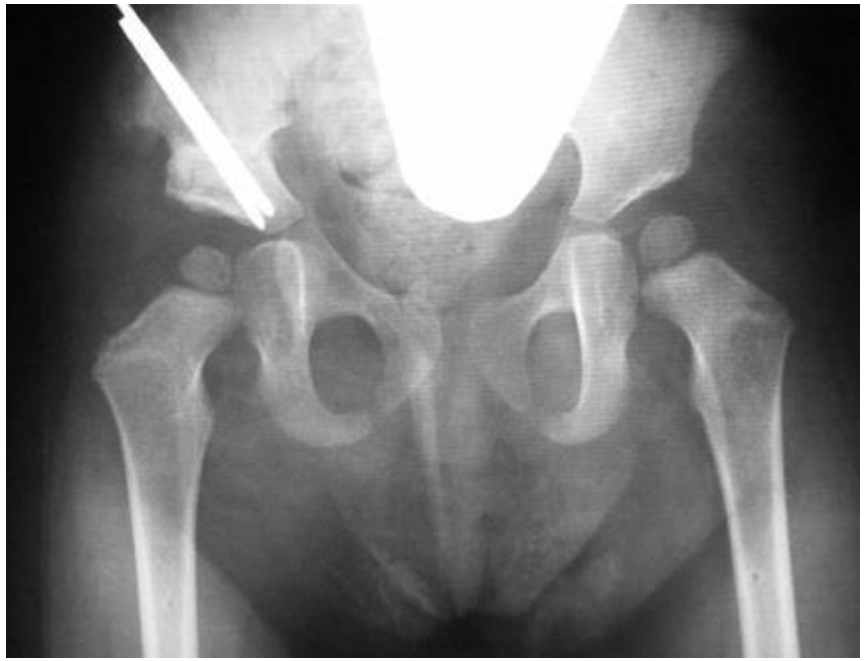
- **closed reduction and spica casting (as next modality)**
- adductor tenotomy(قصها)performed
- Closed reduction under general anesthesia
- arthrogram to confirm reduction intraoperatively
- immobilize in a spica cast
  - hip flexion of 90 deg.
  - abduction of 45 deg
  - neutral rotation for 3 months
- 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 (capsule suturing)
  - Spica Casting (جبسونا اعتيادية)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(in pavlik harness,spika ,,
  - 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