



---

# 11-Common pediatric hip disorder

---

## Objectives:

not given :(

**Team members:** Abdulmohsen alghannam, Essam alshahrani, Abdullah Abuamara

**Team leader:** Mohammed Baqais

**Revised by:** Abdulaziz ALmohammed

**References:** Slides , notes , team435

## Overview

Pediatric patients are different from adult patients!

**How?** Pediatric patients bones have growth plate so they are still growing, their bones are smaller and elastic and they have their own diseases.

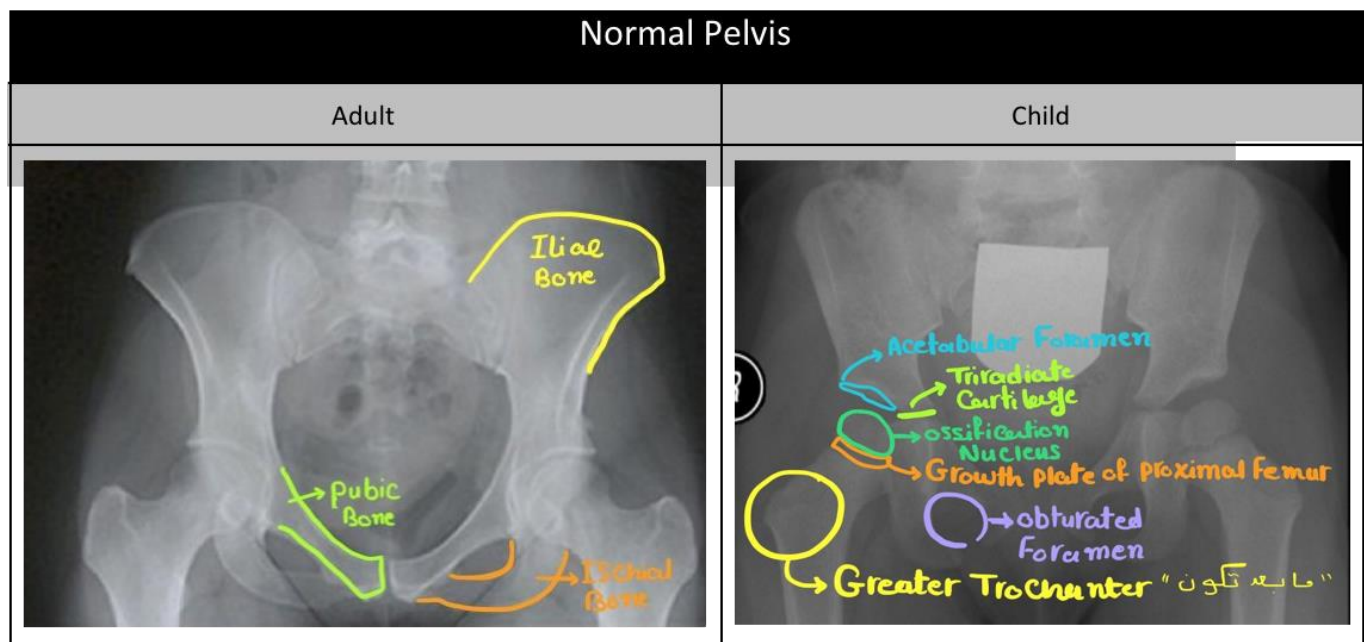
**For example:** did you hear about pediatric knee or hip replacement? NO, because they are still growing so they need to grow until full growth (being adult) to do these surgeries.

### Common pediatric hip problems:

1. **Developmental Dysplasia of the Hip (DDH)**. "most common orthopedic disorder in newborns"
2. (SCFE). Epiphysis Femoral Capital Slipped.

القروث بليت ضعيف، مثل الغراء لما يكون ضعيف ما يمस्क الشيء مع بعض ويبدأ يتزحلق ال head عن ال neck  
plate of the proximal femur"

3. Perthes only in the femoral epiphysis



Triradiate cartilage: y-shaped epiphyseal plate at junction of ilium, ischium and pubis

## Developmental dysplasia of the hip (DDH) الخلع الولادي

[osmosis high yield notes](#)

[osmosis video](#)

[toronto notes](#)

[kaplan notes All](#)

### • Nomenclature:

Congenital Dislocation of the Hip (CDH) OR Developmental Dysplasia of the Hip (DDH)?

CDH is the **old name** of DDH, and they change it because of:

★ DDH is **not** only dislocation it could be subluxation and other...

★ DDH is **not** always congenital it could occur later on in life.

Child born with some sort of dysplasia that progressed to dislocation

Patterns of disease "The main problem is between the head of the femur and acetabulum."

complete Dislocated	<b>Difference between Dislocated and Subluxated:</b> ★ Dislocated: complete separation. completely out of acetabulum. ★ Subluxated: the head subluxates out of joint when provoked/ إزاحة المفصل لكن فيه كوميونيكيشن بين الكارتلاجز
Subluxated	
Dislocatable	means <b>unstable</b> المفروض لما احاول اطلع ال femoral head يتحرك بس ما يطلع بس في حالة dislocatable يصير يطلع بالكامل ولما ادخله يدخل كامل. ال head موجود داخل ال acetabulum بس lax. وإذا ما تعالج ومشي الطفل راح يصير فيه خلل ويكون عنده unstable hip ونحتاج نعمل له stability.
Acetabular dysplasia	everything is normal except for acetabulum " <b>shallow</b> ". more shallow and more vertical than normal acetabulum is open which make it vulnerable to be dislocated

**DDH on X-ray: Very Important!**

signs of DDH in x-ray (SAQ)

1. Head of the femur (ossification nucleus \ center): is **small, above** the horizontal line and **lateral** to the perpendicular line. **Normally** the femoral head should be below horizontal line and medial to the perpendicular line.

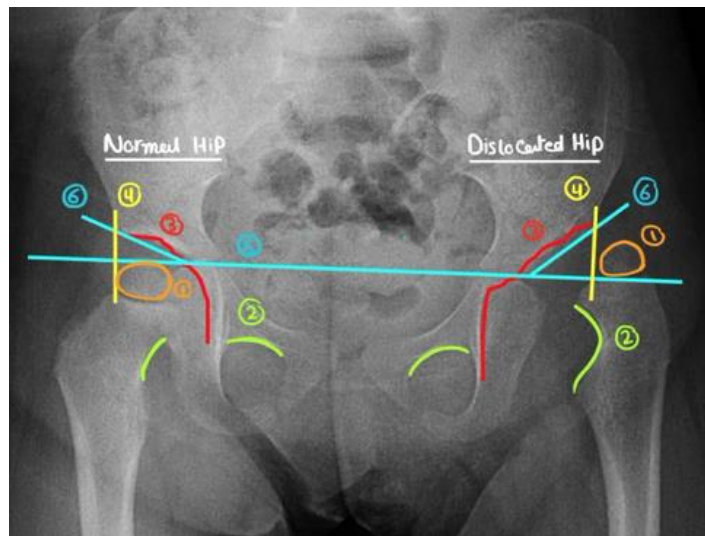
2. Disrupted **Shenton's line**. Normally upper head of obturator foramen مع ماشي neck of femur. In DDH the obturator foramen is seperated from the the neck of femur.

3. Acetabulum is opened and we call it "**Shallow Acetabulum**". The problem happened in the relationship b\w the head of femur and the acetabulum **that's why it's DDH**.

4. Two Perpendicular "Perkin's" lines at the edge of acetabulum

5. **Horizontal line** “Hilgenreiner’s Line”: is between two triradiate cartilages.

\*From base to the tip of the acetabulum: the normal angle is between **18-22 degree**, in DDH it's **30, 40 degree and more**. If the angle is more than 20 degrees that could be a sign of dislocation



In this image, we have both **Dislocation** and **Acetabular Dysplasia**, but in case of pure Acetabular Dysplasia: the femoral head will be inside and everything else is normal except for acetabular shape.

**SAQs**: a scenario of a patient, 9 or 10 months and she has DDH. What are the signs you will see on X-ray?

1. Small femoral head (ossification nucleus/center).
2. Disrupted Shenton's line.
3. Femoral head above the horizontal line (normally it's below)
4. Femoral head lateral to the perpendicular line (Pline). (normally it's medial to it)
5. Shallow Acetabulum or high acetabular index.

### Causes:

Unknown but it's multifactorial, such as: we cannot prevent it, but we can do early screening, diagnosis and intervention.

★ **Hormonal**: Relaxin, oxytocin. These hormones are given to the mother during delivery but it's not true that these hormones cause DDH because DDH happened during development in utero.

★ **Familial**: Ligamentous laxity diseases

★ **Genetics**: Female 4 X male, twins 40% **you should check siblings**

★ **Mechanical**: pressure pushes the hip outside **Very Important in MCQs!**

- **Prenatal**: Breech, oligohydramnios, primigravida (1st Child), twins, abnormality like torticollis+ metatarsus adductus وضع الطفل داخل الرحم يكون هذي علامات خارجية ممكن تدل على الخلع extended hip.

**Postnatal**: anything that cause adduction such as Swaddling, it puts the child in adduction position which increases the risk of dislocation, Strapping

Adduction makes DDH worse! such as swaddling. especially in dislocatable Hip

### The infant at risk: **Very Important in OSCE and SAQ!**

- Positive family history: **10X**
- A baby girl: **4-6 X** معظم مرضانا بنات
- Breech presentation\*: **5-10 X**
- Torticollis\*\*: CDH in **10-20%** of cases
- **Foot deformities**: Calcaneo-valgus and metatarsus adductus.
- **Knee deformities**: hyperextension and dislocation.
- Lt hip more than Rt hip



#### 5 Fs that Predispose to Developmental Dysplasia of the Hip

Family history  
Female  
Frank breech  
First born  
LeFt hip

- **\*breech birth**: is when a baby is born bottom first instead of head first.

Variations of the breech presentation



- **\*\*Torticollis**: defined by an abnormal, asymmetrical head or neck position



**MCQs**: Which of the following is high-risk DDH patient?

**OSCE**: History Taking of DDH patient. (the most important thing is to ask about the risk factors that are mentioned above)!

- Jaundice.
- Twins/Primigravida.**
- Heart Diseases.
- Lung Diseases.
- Kidney Diseases.

- أول مولود؟ ولد ولا بنت؟
- هل فيه احد بالعائلة مصاب بخلع الورك؟ - الولادة كانت طبيعية ولا قيصرية؟ ليه؟ Breech/twins/ ICU <
- لما انولد كان فيه انحراف في الرقبة، القدم، الركبة؟
- ايش الأشياء اللي سويتوها قبل ما تجوني؟
- بعدين نكمل باقي الهيستوري وركز الدكتور على Vaccination

## When risk factors are present:

The infant should be reviewed Clinically and Radiologically.

Case: primigravida mother gave birth of 2 (twins) baby girls. (this case is not like a case of a boy with (-ve family Hx). We do a clinical examination if it's abnormal then we do X-ray or if the clinical examination is normal, but the Pt is a high risk we do X-ray. **So, we do X-ray if the clinical examination is abnormal or high-risk Pt.**

إذا طلعت نورمال أخليهم يجوني بعد شهرين علشان أكشف عليها مرة ثانية، لأنها هاي ريسك بيشنت



Does this increase risk of DDH?

No, it will decrease the risk because it's an abduction NOT adduction.

**REMEMBER:** Adduction makes DDH worse! such as swaddling.


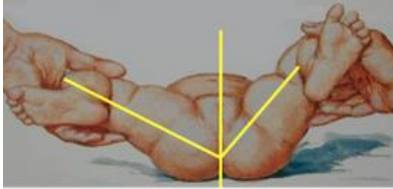
This is used as a treatment!

**Clinical Examination:** Look, Feel, Move, and Special tests. Diagnosis is clinical

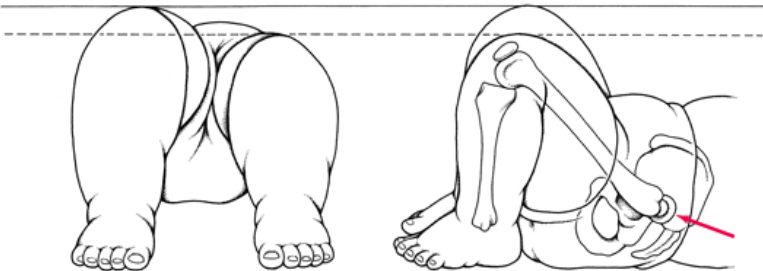
The infant should be quiet and comfortable (if she/he is not, then the clinical examination will be inaccurate). فالحل اننا نعطيهم ملهيات ومسليات زي حلاوة المصاص.

There is No complaint! only if he/she walks! المخلوعة الورك فيها يكون dimpling, that's why we depend on clinical examination. if we diagnose it after the complain it will be considered as late diagnosis

## Clinical Examination

<b>look</b>	<ul style="list-style-type: none"> <li>★ External rotation.</li> <li>★ Lateralized contour asymmetry.</li> <li>★ Shortening. <b>Upward dislocation</b></li> <li>★ Asymmetrical skin folds caused by shortening of affected limb (Anterior – posterior). تكون اكثر واعمق.</li> </ul> 
<b>move</b>	<ul style="list-style-type: none"> <li>★ Limited abduction (&lt; 60 degrees) The affected side is the Lt one. <b>very pathognomonic in DDH</b></li> </ul> <p>إذا انخلع ال hip تقصر الرجل (لأن العضلة أقوى فترفع الرجل)، وإذا انخلع الكتف تطول اليد (لأن عظمه الكتف أثقل).</p>  <p>Usually full flexion and abduction لآخر للطفل</p>

## Special test

<p><b>Galeazzi Test</b> “Difficult if the child &lt;1 year”</p>	<p><b>this test is to check shortening of tibia and femur</b> ,It is performed by flexing an infant's knees when they are lying down so that the feet touch the surface and the ankles touch the buttocks. If the knees are not at the same level then the test is positive.</p>  <p>It will distinguish whether the shortening of limb from <b>femur or tibia</b>. If the tibia is shorter → not DDH. <b>How to know if the shortening is from the tibia or femur?</b></p> <ol style="list-style-type: none"> <li>1- if the shortening is in the femur the knee will be pushed posteriorly</li> <li>2- if the shortening is in the tibia the knee will be pushed anteriorly and downward</li> </ol>
---	--

<p>Ortolani, Barlow test "IMP."</p>	<p>Pt should be less than <b>6 months</b> old and specialized for diagnosis of DDH. <b>Ortolani test relocation</b> of dislocated hip for dislocated hip): Doctor elevate his/her hand then do abduction to pt hip → jerky movement (clunk or click), it's <b>not</b> a sound you feel the movement. so if there is Limited abduction we do t.</p> <p><b>Barlow test</b> (for dislocatable hip): to check the <b>stability</b> of the hip joint. (+)ve: hip unstable/dislocatable → need treatment. (-)ve: hip stable. How? by doing adduction to the hip. fully adducted hips, push posteriorly to try to dislocate hips <b>If the child is more than 6 months you don't have to do it , both of them are painful</b></p> <p><b>MCQ scenario: What is the most reliable test to elicit DDH in 8 months child :</b> A- ortolani test B- Barlow test C- limitation of abduction flexion D- trendelenburgh test <b>Age is very important</b></p>
<p>Trendelenburg sign and gait</p>	<p>to check abductors of the hip , We do this test if the pt is <b>walking</b>. Age older than 2 years.</p>
<p>Limping (waddling gait if bilateral)</p>	<p>We do this test if the pt is walking and it's <b>painless</b>. caused by <b>short limb</b> Age older than 2 years.</p>

If the patient is an 8 months and he/she can walk don't choose Ortolani, Barlow test instead choose limping or trendelenburg sign. If cannot walk choose limited abduction or Galeazzi test

### Investigations: **Very Important in MCQs!**

★ **0-3 months** (to 89 days): Ultrasound.

★ **> 3 months** (from 90 days): pelvic X-ray (AP + abduction), **After 6 months X-ray is reliable.**

below 6 months , the head of femur is not seen , but there are other signs we can look for by opening the leg completely and taking a perpendicular line along the shaft of femur, if the end of line was within acetabulum >> intact

من ٣-٦ فيها خلاف فيه ناس يقولون التراساوند فاذا جا بالاختبار من . الى اقل من ٦ حط التراساوند اذا ٦ واكثر x ray

### Treatment:

The treatment depends on the **age**, the **earlier** started, the **easier** and better the results (**so should be detected EARLY**) and it could be **surgical** or **nonsurgical**.

#### Aim:

- ★ Obtain concentric reduction (**REDUCE**).
- ★ Maintain concentric reduction (**STABILIZE**). by cast.
- ★ In a non-traumatic fashion (**SAFELY** to blood supply)
- ★ **Without** disrupting the blood supply to the femoral head.

**Way:** Refer to the pediatric orthopedic clinic.






Age	Treatment <b>very important in mcqs!</b>
Birth – 6 m	<b>Reduce + maintain</b> with Pavlik harness or hip spica (H.S). in the clinic and pt is awake. first 6 weeks with Pavlik harness then abduction splint for 3 months then we follow up the patient
6-12 m	<b>GA</b> (general anesthesia) Why we give GA even though we will do closed reduction? because we have to do arthrogram in the OR under GA to check for the presence of fibers + <b>Closed reduction + maintain</b> with hip spica if it fails, we do an open reduction. we do not use pavlik harness because the family can release it and we need to repeat the process and give the child GA again
12 - 18 m	<b>GA + Open</b> reduction + <b>maintain</b> with hip spica
18 – 24 m	<b>GA + Open</b> reduction + <b>Acetabuloplasty</b> + maintain with hip spica 18 months is here
2-8 years	<b>GA + Open</b> reduction + <b>Acetabuloplasty</b> + <b>femoral shortening</b> + <b>H.S</b>
Above 8 years	<b>GA +Open</b> reduction + <b>Acetabuloplasty</b> (advanced) + <b>femoral shortening</b> + <b>H.S</b>

• متى نسوي opened ومتى نسوي closed؟ إذا فيه ألياف نسوي الأوبن وإذا مافيه ألياف أسوي الكلوز، طيب كيف أعرف إذا فيه ألياف او لا؟ عن طريق arthrogram and under anesthesia

### Late complications if not treated: **Very Important in MCQs!**

★ **If not treated:** OA (early osteoarthritis) → Stiffness → Erosion of cartilage → Severe Pain → Limping → Spine problems (Early Lumbar spine degeneration) → Difficult life. here the treatment is a total hip replacement in the future.

★ **Other complications:** Leg Length Discrepancy (LLD), Pelvic inequality.

Lt DDH		Bilateral DDH
Before treatment	After treatment	
		

If the image on the Lt is a case of 19 months girl, What is the treatment for her?

See the table above: (GA + Open reduction + Acetabuloplasty + maintain with hip spica).

## Slipped capital femoral epiphysis (SCFE) & Perthes

SCFE and Perthes are the same except for the age group and the diagnosis

[osmosis high yield notes SCFE](#)

[osmosis high yield notes perthes](#)

[DR Nabil SCFE](#)

[osmosis video perthes](#)

[Toronto notes SCFE](#)

[kaplan notes All](#)

[Toronto notes Perthes](#)

SCFE	Perthes "Legg-Calvé-Perthes Disease"
<p><b>Where:</b> at the level of the growth plate (Between head and neck of femur).</p> <p><b>Why:</b> It could be Hormonal, <b>Metabolic</b>, Mechanical, obesity, Trauma, Unknown. The big number of patients have a metabolic cause, so we have to do a test for growth, thyroid, and parathyroid hormones.</p> <p><b>High-risk patients are:</b> Males, black, obese and <b>8-12 years old</b>. Also, increase if other side affected.</p> <p><b>History:</b> <b>Hip pain/referred knee pain (only)</b> اوعى تنسى اوعى تنسى <b>hip</b> تفحص ال hip, Minor trauma or no trauma, Limping (<b>painful</b>). If the pt come complaining of knee pain and I did X-ray and it was normal, <u>what is the next step?</u> pelvic X-ray.</p>	<p><b>Where:</b> at the level of head of the femur.</p> <p><b>Why:</b> ↓ vascularity of head of the femur (avascular necrosis).</p> <p><b>Cause:</b> Unknown So, we can prevent it? Nobody knows الأوعية تقفلت وتسببت في موت الخلايا، ويبدأ الجسم يتصرف مع هذه الخلايا الميتة replacement then resorption فلانم أنا أحطها في مكان مهياً ل remodeling أنه يكون بشكل طيب course of the dx take 4 years</p> <p><b>High-risk patients are:</b> <b>4-8 years</b>, males &amp; obese.</p> <p><b>The severity of the disease depends on:</b> the amount of femoral head involvement. <b>Head involved more &gt;&gt; less prognosis</b></p> <p><b>History:</b> <b>Hip pain/knee pain (only)</b>, Minor trauma or no trauma, Limping (<b>painful</b>).</p>

**Clinical Examination:** they will come in a scenario

- ★ Hip in ER → decreased external rotation.
- ★ Decrease internal rotation (IR).
- ★ Decrease Abduction.
- ★ Usually painful ROM.
- ★ Limping (painful).

If the pt coming complaining of painful ROM & painful Limping with SCFE risk factors, here we suspected that the pt has SCFE.

### Investigations:

#### ★ X-ray:

- **Pelvis:**

Early: could be normal or increase growth plate space [pre slip phase].

Late: slippage positive.

- **Knee.**

★ **MRI:** can help if X-ray is not clear or doubtful.

If the Hx and PE suggest SCFE and X-ray is normal we do MRI.

i need to do full hormonal and metabolic investigation Early Vs Late SCFE:

كل ما تزحلق الهيد كل ما قطعت عروق أكثر فيزيد avascular necrosis و قلت نسبة الشفاء، أما إذا كانت العروق المتقطعة أقل فنسبة الشفاء تكون أعلى.

### Treatment:

Refer to orthopedic as an **emergency** (not to the clinic!) case. What they will do?

If it is acute slipping > reduction and pinning

★ In situ pinning(chronic slipping) – to prevent further damage to the( don't try reducing على طول اعمل fixation) vascularity.

★ Protected weight bearing for 3-4 weeks then full weight bearing.

★ No sport for 6 months.

**Late complications:** **Very Important in MCQs!**

- ★ Femoral Acetabular Impingement (FAI)\*\*\*.
- ★ Early arthritis.
- ★ Leg Length Discrepancy (LLD).
- ★ Pelvic inequality.
- ★ Early Lumbar spine degeneration.(ANY ABNORMALITY IN HIP WILL CAUSE SPINE PROBLEMS)

\*\*\* A condition in which extra bone grows along one or both bones that form the hip joint — giving the bones an irregular shape.

### Clinical Examination:

- ★ Decrease Abduction.
- ★ Decrease internal rotation (IR).
- ★ Usually painful ROM. (↓↓↓)
- ★ Limping (painful).

If the patient comes with painful limping and a history of minor trauma. What is your DDX?

If you tell me fracture, SCFE and Perthes (كثير الله خيركم المريض يجي يشكي من ألم ولا يقدر يدعس على رجله -

### Investigations:

#### ★ X-ray:

- **Pelvis:**

↓ head size (irregular shape).

Early: X-ray might not show anything.

- **Knee.**

★ **MRI:** can help if X-ray is **not clear** or **doubtful**.

If the Hx and PE suggest Perthes and X-ray is normal we do MRI.

### Treatment:

★ Very controversy

★ Refer to pediatric orthopedics as an **urgent** case

★ Guidelines of treatment:

- Control pain.
- Maintain **ROM**.
- **Hip containment** inside the acetabulum. If outside, we do surgery

We follow up the patient and make sure that the head of the femur is inside the acetabular.

هنا العلاج ما يحتاج تدخل جراحي، الفيسيلز المسكره تفتح من الله بدون عملية أو أي شيء ثاني.

### Late complications: **Very Important in MCQs!**

- ★ Early arthritis.
- ★ Leg Length Discrepancy (LLD).
- ★ Pelvic inequality.
- ★ Early Lumbar spine degeneration.

Which Image is the worse, Rt or Lt?

Lt



Rt



On the Lt side, there is widening of growth plate (pre-slipped stage) → needs MRI The Rt one is the worse (there is slippage) which increases the risk of Arthritis

Treatment of SCFE



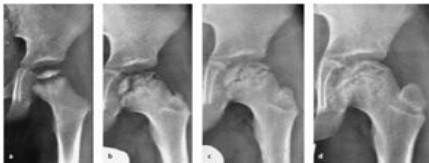
On the right side only wide growth plate (we put screw for prevention) on the left side both widening and slipping

Perthes Disease on the Lt



Perthes on the left side (small head of femur with fragmentations)

Healing phases of Perthes Disease



## MCQ

**1-16 months old baby has a DDH, which one of the following is the management?**

- A. Pavlik harness.
- B. ORIF.
- C. open reduction w/ acetabuloplasty.
- D. open reduction w/o acetabuloplasty

**2-An 8-year-old child came to the ER with painful limping x-ray was done in the picture, what is the dx?**



- A. Perthes disease
- B. DDH.
- C. SCFE.
- D. Septic arthritis.

**3-4 months old child with suspicion of reducible DDH, what is the most sensitive test:**

- A. Limited abduction.
- B. Ortolani.
- C. Barlow.
- D. Galeazzi.

**4-8-month-old patient with DDH what is the best test to use?**

- A.Barlow,
- B.ortolani
- c.trendelenburg
- D.limited abduction

**5-8 months old child brought by his parents because he has painless limping that was noticed recently. Which one of the following tests will be positive?**

- A.Galeazzi
- B.Ortolani
- C.Barlow
- D.Thombson

**6-which of the following is a risk factor for DDH?**

- A-Oligohydramnios
- B-negative family history
- C-3rd child
- D-Baby male

**7-A** 1-month-old infant is brought to the pediatrics department by his parents for a routine examination. He is their first child, a result of a healthy pregnancy with no complications. His mother was properly immunized and was negative for Group B streptococcus colonization. On examination, the child is alert with positive Moro, Babinski, and grasp reflexes. Pulmonary, cardiac, and abdominal examinations are unremarkable. His left leg appears shorter than his right and a clunk is noted during Ortolani examination. Which of the following is a risk factor for the most likely diagnosis?

- A. Asian American ethnicity
- B. First born
- C. macrosomia
- D. vaginal delivery

**8-A** 5-year-old boy comes to the clinic with his father because he has been limping for three weeks. Past medical history includes attention deficit hyperactivity disorder, but the boy does not take any medications. History is unremarkable for trauma or recent illness. His temperature is 37.1°C (98.8°F), pulse is 90/min, respirations are 22/min, and blood pressure is 100/70 mm Hg. Physical examination shows a painless limp of the right lower extremity with limited internal rotation and abduction of the right hip joint. A hip radiograph is obtained and shows the right proximal femoral epiphysis to be misshapen and more horizontal compared to the unaffected hip, the femoral head appears collapsed. Which of the following is the most likely diagnosis?

- A. Perthes disease
- B. DDH.
- C. SCFE.
- D. achondroplasia

1-B 2-C 3-B 4-D 5-A 6-A 7-B 8-A