Developmental dysplasia of hip
Published on 29.03.2016

DOI: 10.1594/EURORAD/CASE.13303
ISSN: 1563-4086
Section: Paediatric radiology
Area of Interest: Musculoskeletal joint
Procedure: Education
Imaging Technique: Conventional radiography
Special Focus: Dysplasias Case Type: Clinical Cases
Authors: Hidayatullah Hamidi, Sahar Maroof
Patient: 4 years, female

Clinical History:

4-year-old girl and 4-year-old boy with history of abnormal gait since birth. No family relationship between the patients. No family history of DDH. Such late presentation of untreated cases may be unusual, but due to low socioeconomic status and limited access to medical care, they are not very rare in Afghanistan.

Imaging Findings:

Plain radiograph Findings:
Patient A:
Bilateral femoral heads are located superolateral to their normal positions (superior to Hilgenreiner's lines and lateral to Perkin's lines. (Figure 1a)
Bilateral acetabular indices are increased; Right: 38 degrees and left: 39 degrees. (Figure 2a)
Pseudoacetabular cavities are formed bilaterally superolateral to normal hip joints. (Figure 1a)
Shenton's curves are disrupted on both sides. (Figure 3a)

Patient B:
Left femoral head is located in superolateral quadrant made by Hilgenreiner's and Perkin's lines while right femoral head is in the inferomedial quadrant (Normal position). (Figure 1b)
Left Shenton's curve is disrupted and right is normal. (Figure 3b)
Left side acetabular index is increased: 38 degrees; but right is normal: 14 degrees. (Figure 2a)
Putti’s triad is present in left side:
1- Superolateral displacement of proximal femur
2- Increased acetabular angle
3- Small capital femoral epiphysis

The diagnosis of bilateral DDH was made for patient A and left side DDH for patient B.

Discussion:

Background

Developmental dysplasia of the hip (DDH) is a spectrum of abnormalities resulting in abnormal development of the femoral head and acetabulum. It denotes a wide spectrum of pathologic conditions, ranging from subtle acetabular dysplasia to irreducible hip dislocation with proximal femoral displacement. [1]

Risk factors for congenital DDH include first born status, female sex, positive family history, breech presentation and
oligohydramnios. [2]

Acetabular dysplasia describes the abnormality in the development of the acetabulum, including an alteration in size, shape and organization. [3, 4]

The hip is called dislocatable when application of posteriorly directed force on the hip positioned in adduction can lead to complete displacement of the femoral head from the margins of acetabulum. Similarly, the hip is called subluxable, if just gliding of the femoral head is noticed.

Imaging features

Ultrasound is the preferred technique for clarifying the physical findings, evaluating a high-risk infant and monitoring DDH before ossification of femoral head. [1, 3] There is evidence that ultrasound screening can reduce rate of late DDH as well as the need for surgical interventions. [5]

After ossification of femoral head, radiograph can be used as a precise diagnostic tool. Here we describe some of the most important radiographic measurements for diagnosis of DDH:

1- Hilgenreiner line: Line crossing both triradiate cartilages.
2- Perkins line: Vertical line perpendicular to Hilgenreiner line and intersecting lateral rim of acetabular roof.

Normal femoral heads should be locatee in the inferomedial quadrant made by these two lines. (Figure 1b)

2- Acetabular angle (acetabular index): Formed by Hilgenreiner line and a line drawn through the acetabular roof. [3] Gwynne et al. described dysplasia as acetabular index of greater 30 degrees at 6-months of age. [6] (Figure 2)

4- Shenton line: C-shaped curve along inferior border of superior pubic ramus and inferomedial border of femoral neck. Normal curve is interrupted in DDH. (Figure 3)

5- The Putti's triad for DDH is: superolateral displacement of proximal femur, increased acetabular angle and small capital femoral epiphysis. [7] (Figure 1b)

Outcome:

As early diagnosis and treatment is critical in order to achieve best functional outcome, screening programs are required.

Treatment and outcome depends on the age of the patient and reducibility of the hip joint. Abduction brace like Pavlik harness is used for treatment in early life while closed reduction and spica casting can be performed in failed cases. Several open reduction techniques are described. Unsuccessful surgical attempts are likely to lead to substantial morbidity. [8]

Differential Diagnosis List: Developmental dysplasia of hip, Not applicable, Not applicable

Final Diagnosis: Developmental dysplasia of hip

References:


Starr, Vanessa, and Bo Yoon Ha (2014) Imaging Update on Developmental Dysplasia of the Hip With the Role of MRI. American Journal of Roentgenology 203.6: 1324-1335. (PMID: 25415712)


Figure 1

Description: Patient A:
Bilateral acetabular indices are increased; The right acetabular angle measures 38 degrees and the left 39 degrees.
Pseudoacetabular cavities are formed bilaterally superolateral to their normal positions. Origin: French Medical Institute for Children
Description: Patient B:
Left acetabular index is increased (38 degrees while right is normal (14 degrees). Putti's triad is present in the left side: (Superolateral displacement of proximal femur, increased acetabular angle and small capital femoral epiphysis). Origin: French Medical Institute for Children
Figure 2

Description: Patient A:
Bilateral femoral heads are located supero-lateral (red circles) to their normal positions (black circle). They are seen superior to Hilgenreiner's lines and lateral to Perkin's lines on both sides. Origin:
French Medical Institute for Children
**Description:** Patient B:
Normal-positioned right femoral head is noted (black circle).
Left smaller femoral head is located superolateral to Hilgenreiner's and Perkin's lines (red circle), while its normal position is inferomedial to them (black circle). **Origin:** French Medical Institute for Children
**Description:** Patient A:
The Shenton's curves are disrupted on both sides. **Origin:** French Medical Institute for children
Description: Patient B:
The Shenton's curve is preserved in the right side (right black curve) while it is disrupted in the left side (red arrow). Origin: French Medical Institute for children