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Ahmad Mohammad Ghith, 2006

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List of Abbreviations

3D	**:**	Three Dimensional
DDH	**:**	Developmental dysplasia of hip joint
FHC	**:**	Femoral Head Coverage
MHz	**:**	Megahertz
SCFE	**:**	Slipped Capital femoral Epiphysis
US	**:**	Ultrasound

ROLE OF ULTRASONOGRAPHY IN DYSPLASIA OF HIP JOINT

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دور الموجات فوق الصوتية
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Introduction and Aim of Work

The hip is a synovial, ball-and-socket type joint formed by the head of the femur and acetabulum. The acetabulum fits tightly around the head of the femur. The hip sacrifices degree of movement for additional stability. **(Huston and Brandser, 2004)** Developmental dysplasia of hip (DDH) is the result of a disruption in the normal relationship between the acetabulum and femoral head. Without adequate contact between them, neither develops normally. **(Norton, 2005)** Excessive capsular laxity and shallow acetabulum at birth are the primary initiating factors ***(Paton, 2001)*****.**

Ultrasound examination either by static or dynamic means is now well established and its role and influence have spread widely. **(Jones, 2000)** With ultrasonography, the cartilage can be visualized and the hip can be viewed while assessing the stability of the hip and the morphologic features of the acetabulum ***(Homer et al., 2000)***.

The aim of the work is to high light the important role of the ultrasonography in the diagnosis of developmental dysplasia of hip joint.

Anatomy of the Hip Joint

The hip is a synovial, ball-and-socket type joint formed by the head of the femur and acetabulum. The acetabulum fits tightly around the head of the femur, the hip sacrifices degree of movement for additional stability.

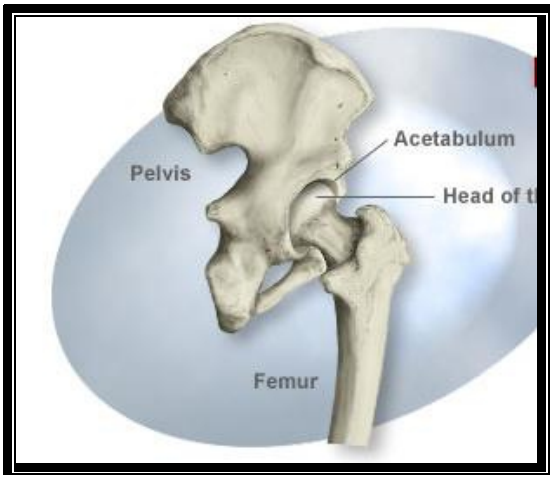

Figure (1): The hip is a ball-and-socket joint where the head of the femur articulates with the cuplike acetabulum of the pelvic bone ***(Quoted from Southern California Orthopedic Institute. 2000)***.

The hip allows movement in all three planes of motion including flexion-extension, abduction-adduction and medial to lateral rotation. Abduction is movement of the leg away from midline and is limited by the greater trochanter contacting the outer ridge of the acetabulum. Adduction is movement of the leg towards the midline. Medial rotation is seen by rotating the leg inward about a vertical axis. Lateral rotation is a more extensive movement for the hip, and is outward about a vertical axis ***(Huston and Brandser, 2004)***.

The center of the hip joint lies 1.2 cm below the middle third of the inguinal ligament ***(McVay, 1986)***.

Normal Hip Development:

The hip joint begins to develop at about the seventh week of gestation, when a cleft appears in the mesenchyme of the primitive limb bud. These precartilaginous cells differentiate into a fully formed cartilaginous femoral head and acetabulum by the 11th week of gestation. If there is failure in normal embryogenesis of the hip, the consequence is a major anomaly. **(John et al, 2002).**

At birth the femoral head and the acetabulum are mainly cartilaginous, with a thin rim of fibrocartilage called the labrum. ***(Nerys et al, 2005)***.

The hyaline cartilage of the acetabulum is continuous with the triradiate cartilages, which divide and interconnect the three osseous components of the pelvis (the ilium, ischium, and pubis).The surface of the acetabular cartilage, which abuts the bone of the pelvis, is made up of epiphyseal cartilage in the shape of a hemisphere and functions as a major growth plate. Growth of this epiphysis is essential for acetabular development, and any damage to the periacetabular area may induce a growth disturbance. The limbus also contributes significantly to the development of acetabular depth.

The proximal femur has a complex and often misunderstood growth pattern. In the neonate, the entire upper

femur is a cartilaginous structure in the shape of a femoral head and greater and lesser trochanters

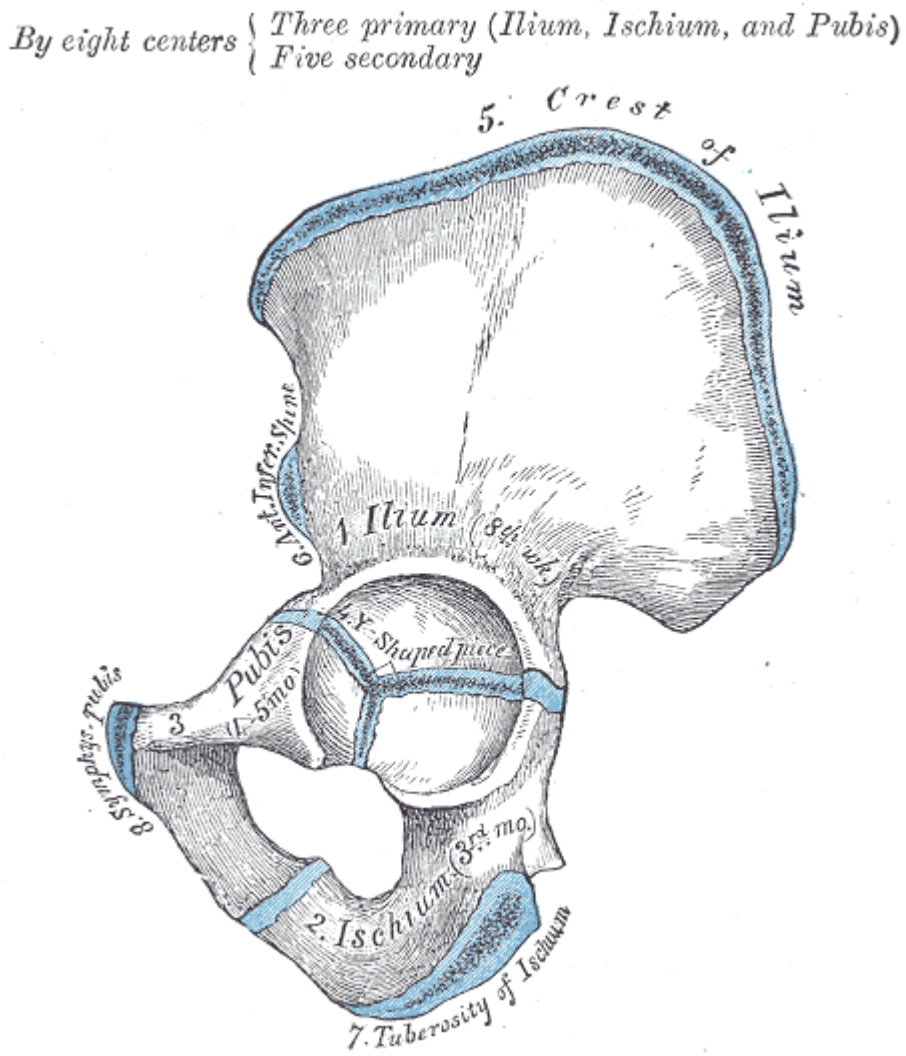

Figure (2): Plan of ossification of the hip bone. The three primary centers unite through a Y-shaped piece about puberty. Epiphyses appear about puberty, and unite about twenty-fifth year ***(Quoted from Grays, 2000)***.

Development of the proximal segment occurs through a combination of appositional growth on the surfaces of the upper femur and epiphyseal growth at the juncture of the cartilaginous

upper femur and the femoral shaft. In the normal femur, an ossification center appears in the center of the femoral head between the fourth and seventh months of postnatal life. This center grows until physeal closure in late adolescence, at which time it has become the adult femoral head, covered with a thin layer of articular cartilage. During the period of growth, the thickness of the cartilage surrounding this bony nucleus gradually decreases, as does the thickness of the acetabular cartilage. The thickness of the cartilage accounts for the widened radiographic appearance of a normal hip in a child.

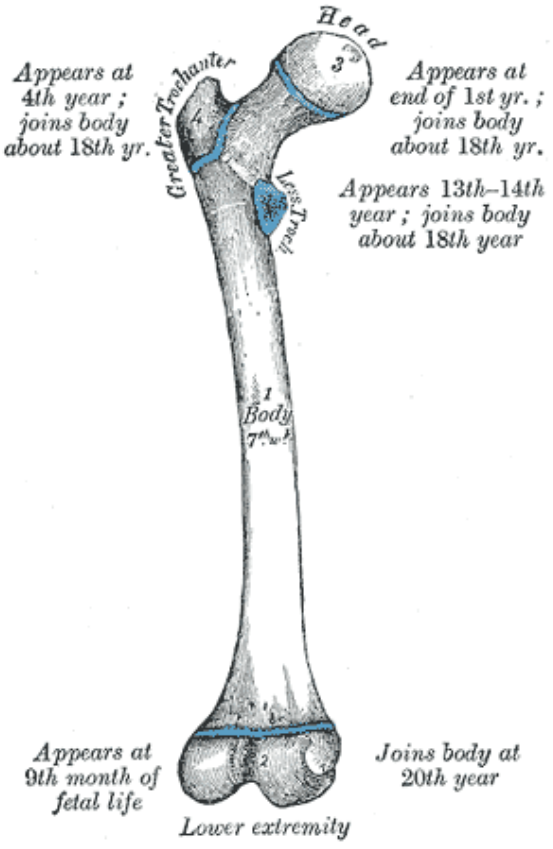

Figure (3): Plan of ossification of the femur. From five centers ***(Quoted from Grays, 2000)***.

As a child matures, three acetabular epiphyseal centers develop that are responsible for the final contours of the hip socket. The os acetabulum, which is the largest of the three, appears at about 8 yeas of age and forms along the anterior wall as part of the pubis. The acetabular epiphysis, which also ossifies at around 8 years, forms along the superior edge of the acetabulum as part of the ilium and fuses at about 18 years. The third center is a small epiphysis in the posterior or ischial area, which develops at age of 9 years and fuses at 17 years.

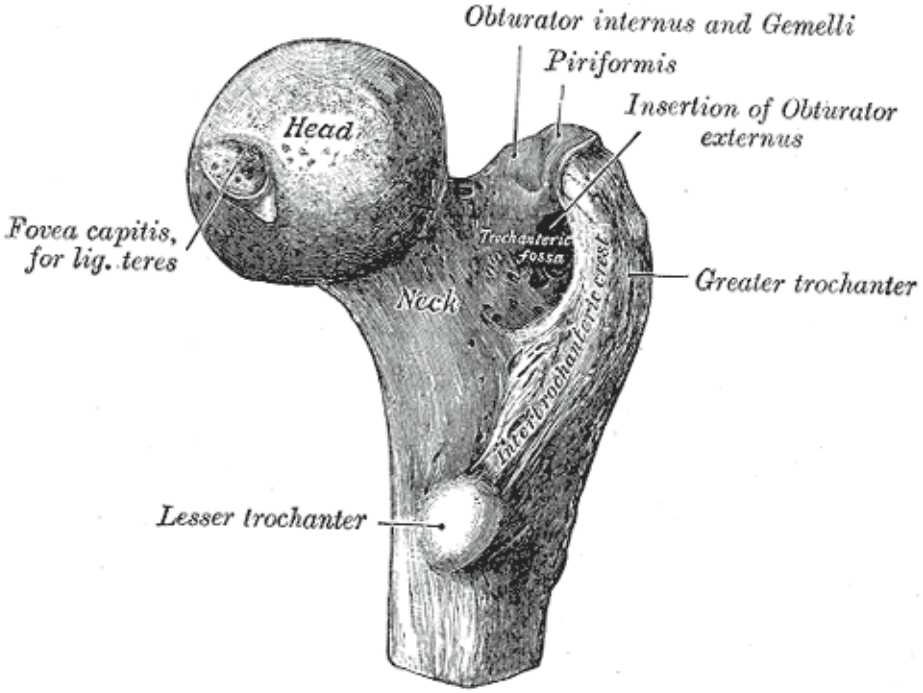

Figure (4): Upper extremity of right femur
(Quoted from Grays, 2000).

Excessive pressure on the cartilaginous upper femur can cause a loss of vascular perfusion, resulting in necrosis of the