THE ROLE OF DIAGNOSTIC RADIOLOGY AND IMAGING IN DISLOCATION OF THE HIP JOINT

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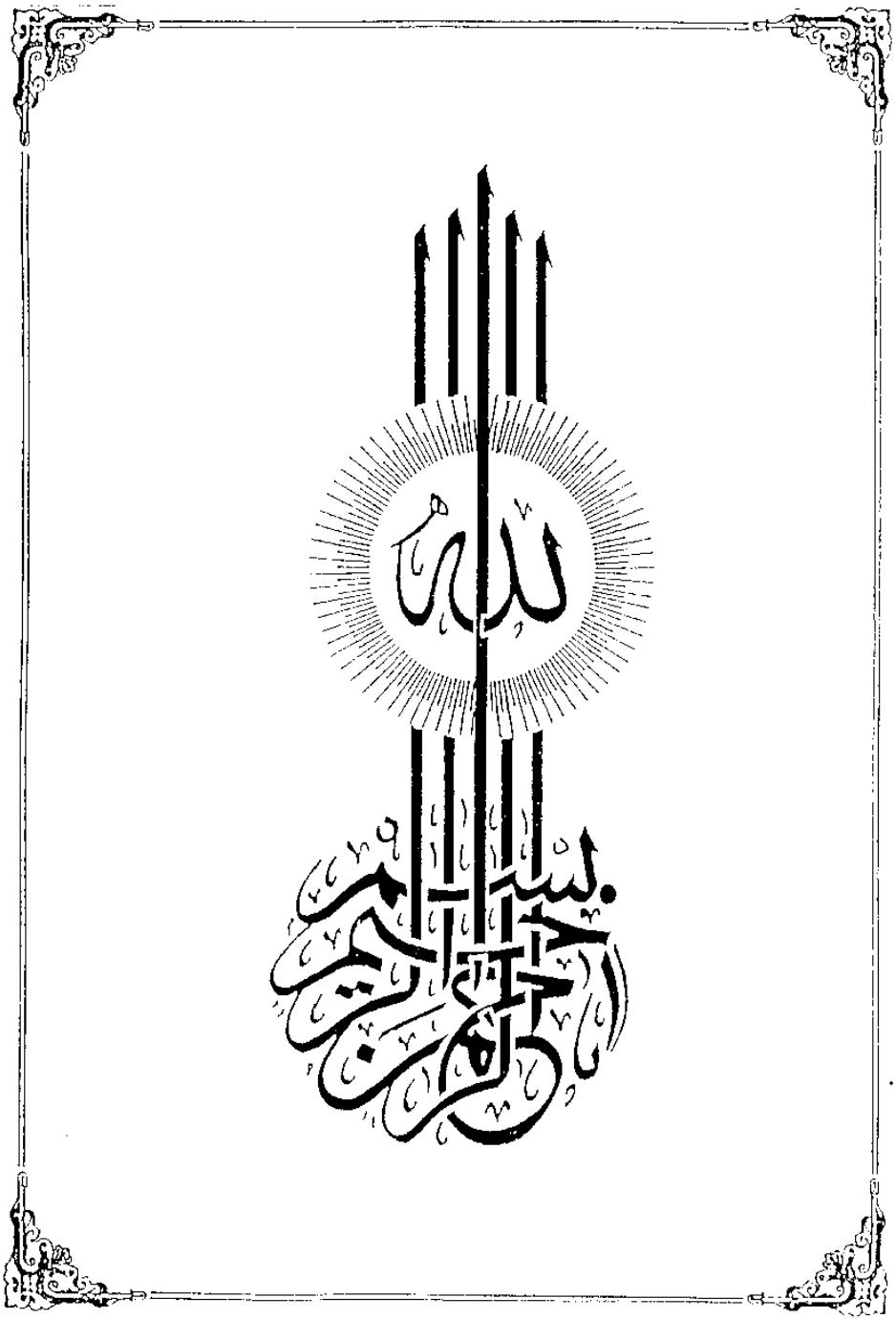
Contents

		Page
I	Introduction and aim of work	3
II	Radiological anatomy and Embryology;	5
III	Pathology .	28
IV	Materials and Methods	59
V	Illustrative cases.	73
VI	Discussion.	93
VII	Summary and Conclusion.	107
VIII	References.	108
IX	Arabic Summary .	115



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INTRODUCTION

Introduction and Aim of The Work

The diagnosis of traumatic lesions of the skeleton especially the hip , forms a major portion of the work of most radiological departments.

Indeed, the roentgen study may be the confirmation of the clinical fact of a patient with joint manifestation of that disease (e.g. in congenital dislocation of the hip).

On the other hand there is a group of patients with complaints referrable only to the hip joint without other clinical findings here the roentgen changes are the first manifestation of disease.

In the evaluation of this group the radiologist assumes a primary responsibility for the patient's care and management (e.g. septic suppurative or tuberculous arthritis).

During the management of congenital dislocation of the hip the radiologist will be asked to decide whether reduction has been attained or maintained in such cases tomography of arthrography may be used.

In traumatic dislocation of the hip a good clinical examination including the neurological status before and

after reduction of the hip should be carried out, in addition prereduction X-rays of the affected hip and postreduction X-rays of both hips for comparison should be obtained. C.T. scans may be helpful in determining the causes of unreduced dislocation .

In this study we tried to assess the different radiological manifestations and imaging of dislocation of the hip joint based on the pathological changes that occur in every type of dislocation .

Embryology

EMBROYOLOGY

Normal Hip Development

It begins in the embryo, is regulated by genes and follows a predictable sequence . The embryonic age or development may be measured by the crown-rump (C-R) Length or by embryonic stage which is identified by external and internal features. Most investigators use the C-R Length method. Staging appears more accurate than C-R Length. C-R Length is used to determine fetal age. All Elements of the hip differentiate in situ by growth and simple enlargement with minor changes in relationship between structures .

Four weeks after ovulation (5mm C-R) the small lower limb buds begin on the anterior lateral body wall at the lumbar and first sacral segment levels. These buds contain mesenchyme which differentiate to cartilage, bone, synovia, ligaments, muscle and tendons. Mesenchymal cells form a central mass, the blastema,the central avascular blastema forms the skeleton. During prenatal life both proximal and distal femur ends are Club-shaped .

In early stages the femoral shaft is relatively thick but later the shaft becomes thinner and longer in ralation to the femur ends. At 6 weeks when the embryo measures 10 mm C-R , the highly cellular blastema condenses to form the cartilage hip model .

The primitive chondroblasts then differentiate their nuclei separate as the cells secrete matrix material into the cytoplasm and the club-shaped femur forms. In older embryos (14 to 15 mm C-R); a shallow saucershaped depression appears in the innominate blastema proximal to the femoral head . This future acetabulum now forms 65 to 70 degrees of an arc . A precartilaginous center occurs in the middle of the femoral shaft at 12 mm .

By 17 mm an interzone is present between the femur and innominate bone anlagen composed of randomly oriented homogeneous cells.

At 20 mm the interzone separates into three layers the two outer layers continuous with the perichondrium of the

femoral and innominate anlagen are chondrogenous, while the middle layer consists of loosely packed mesenchymal cells. Both tendons and capsule appear as cellular condensations in early embryo .

Collagen fibres first appears in the iliopsoas tendon at 22 to 25 mm and in the capsule at 28 mm . The ligamentum teres and acetabular appear as increased cell densities at 22 to 25 mm . The primary midshaft femur ossification center appears in Embryos 23 to 35 mm while the greater and lesser trochanters appear as slight elevations on the femur .

Hip joint cavitation begins in the late embryonic or early fetal period (C-R 27 to 31 mm) the joint space forms along the femoral head periphery, gradually extending centrally . When the acetabulum separates from the femoral head , it is a deep cavity almost totally enclosing the head.

As growth proceeds the acetabulum depth continues to increase but the extent to which it encloses the femoral head decreases reaching a minimum at birth when it represents one-third of a sphere .

The femoral head shape changes during prenatal development. In the embryo the femoral head represents 80% of a sphere but decreases to 50% at birth.

Postnatally the femoral head again becomes more spherical and continues to increase gradually until development cases.

At the end of the embryonic and early fetal period, the primary ossification center appears in the ilium (38 to 39 mm), and the bursa for the obturator internus tendon first appears (39 to 33 mm). An early increased cell density (22 to 25 mm) can be identified as acetabular labrum but only clearly forms at (49 to 50 mm).

Blood vessel enter the acetabular fossa at 30 to 33 mm, but femoral head vascularization begins at 40 to 50 mm.

Primary ossification centers begin in the ischium at 105 to 124 mm and in pubis at 161 mm. Stanley & Chung (1981).

Anatomy

Anatomy of the hip joint

The hip joint is multiaxial and of the ball and socket type in which the head of the femur articulates with the cup shaped fossa of the acetabulum.

Its centre lies 1-2 cm below middle third of the Inguinal ligament.

It is of weight bearing type, it helps to maintain the body in erect posture without excessive sustained muscle action . Gray's(1973).

Since the essential characteristic of the hip joint is stability, the chief aim in the treatment of its pathological conditions is the retention of this stability. If mobility also can be obtained the result is better but mobility without stability is useless.

The hip joint differs from the shoulder joint in that the bones are heavier and have more prominent processes and the muscles surrounding it are larger and more powerful (Chester B - Mcvay 1984).

The head of the femur is Completely covered with articular cartilage except over the small areas on roughened pit to which the ligament of the head is attached. (Figure no.1 a & b).

The Acetabulum:-

It is a deep hemispheric socket which is a cup-shaped cavity 3-5 cm in diameter located on the lateral surface of the innominate bone, which articulates with the femoral head to form the hip joint.

The three components of the acetabulum are its superior $\frac{2}{5}$, two fifths composed of ilium, its inferolateral $\frac{2}{5}$ two fifths of Ischium and its medial one fifth of pubis. Stanley& Chung(1981).

At birth they are set apart from each other by a triradiate or Y- shaped bar of cartilage which begins to ossify at the twelfth year and the bony Segments fuse by the sixteenth or seventeenth year.

The central non articular acetabular fossa filled with a haversian fat pad is separated from the hyaline cartilage