

Hip Ultrasonography in Osteoarthritis

Thesis

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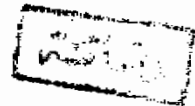
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بسم الله الرحمن الرحيم

ارب أوزعني أن أشكر نعمتك التي أنعمت علي وعلى
والدي وأن أعمل صالحاً ترضاه وأصلح لي في ذريتي
إني تبت إليك وإني من المسلمين

صدق الله العظيم

(سورة الأحقاف - آية رقم ١٥)

أحمد
محمد



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INTRODUCTION AND AIM OF THE WORK

Introduction and aim of the work

Osteoarthritis (OA) is the most common joint disease and the leading cause of disability in the elderly (Brandt, 1985). It is a degenerative joint disease that affects both axial and peripheral joints. The hips are one of the most frequently affected joints. (Forman et al., 1983).

The term degenerative joint disease and osteoarthrosis, have been suggested as being more descriptive, since degeneration of cartilage represents the prominent pathologic change. However, clinical and experimental studies have demonstrated that mild to moderate synovitis may be an associated finding (Ronald and Machae, 1981).

In idiopathic (primary) osteoarthritis, the most common form of the disease, no predisposing factor is apparent. Secondary OA appears pathologically indistinguishable from idiopathic OA but is attributable to an obvious underlying cause. (Brandt, 1988).

The diagnosis of OA is traditionally based on clinical and radiographic features. Laboratory testing may help in identifying one of the underlying causes of secondary osteoarthritis (Brandt, 1988).

Ultrasonographic scanning is a form of imaging using mechanical vibrations occurring at a frequency too high to be detected by the human ear. The ultrasound used in medical purposes has a frequency between 1-15 MHZ (Ross, 1983).

Ultrasonography is capable of the assessment and the detection of hip abnormalities that are not detected clinically or radiographically, and as a result of its accuracy, it is recommended for initial examination of

infants who demonstrate abnormal clinical signs or at an increased risk for congenital dislocation of the hip. (Langer, 1981).

The initial joint ultrasonographic examination was done with the B-mode and then the gray scale whenever it was available (Mayer et al., 1976).

The aim of this work is to study the ultrasonographic findings in the hip joint in osteoarthritic patients and to present some typical ultrasonographic features of the disease.

REVIEW OF LITERATURE

ANATOMY OF THE HIP JOINT

Anatomy of the hip Joint

Introduction

The hip joint is the largest joint in the body. It is a synovial joint of ball and socket variety and multi axial type. It is one of the most important joints in the body (Ellis, 1992).

Articulation: (Fig. 1 and Fig. 2)

The head of the femur articulates with the cup shaped fossa of the acetabulum.

The head of the femur is completely covered with articular cartilage except for a small roughened pit to which the ligament of the head is attached it is thick at the centre and thinner towards its periphery. (Last, 1978).

The articular surfaces are reciprocally curved, the close-pack position being one of full extension with some degree of abduction and medial rotation. (Warwick et al., 1973).

The acetabular articular surface, covered with hyaline cartilage, is a-c-shaped concavity. Its peripheral edge is deepened by a rim of fibrocartilage. The acetabular labrum which encloses the femoral head beyond its equator, thus increasing the stability of the joint.

The labrum is continued across the acetabular notch as the transverse ligament. Which, unlike the labrum, has no cartilage cells.

The transverse ligament gives attachment to the ligament of the head of the femur.

The central non articular part of the acetabulum is occupied by a pad of fat (The Haversian pad) (Last, 1990).

The capsule of the hip joint (Fig-3).

The fibrous capsule, strong and dense, is attached above to acetabular margin 5-6 mm beyond its labrum, in front to the outer labial aspect and, near the acetabular notch, to its transverse acetublar ligament and the adjacent rim of the obturator foramen. It surrounds the femoral neck and is attached in front to the trochanteric line; above to the base of the femoral neck; behind about 1cm above the trochanteric crest; below to the femoral neck near the lesser trochanter. Anteriorly many fibres ascend along the neck as longitudinal retinacula, containing blood vessels for both femoral head and neck (Williams, 1989).

The capsule is thicker antero-superiorly where maximal stress occurs, particularly in standing, postero-inferiorly it is thin and loosely attached. It has two sets of fibres, circular and longitudinal. The circular fibres (Zona orbicularis) are internal, forming a collar round the femoral neck; though partly blended with pubofemoral and ischio-femoral ligaments, these fibers are not directly attached to bone. Externally, longitudinal fibres are most numerous in the anterosuperior region, reinforced by the iliofemoral ligament.

The capsule is also strengthened by pubofemoral and ischiofemoral ligaments; externally it is rough, covered by muscle and separated from psoas major and iliacus by a bursa (Williams, 1989).

Ligaments of the hip joint:-

(1) The pubofemoral ligament

It arises from the pubic part of the acetabular rim and the superior pubic ramus. As it passes distally it blends with the inferior part of the fibrous capsule, although some of its fibres may be traced to the lower part of the femoral neck. It becomes taut in extension of the joint and it also assists the adductor muscles in checking excessive abduction of the thigh (Romanes, 1981).

(2) The ischiofemoral ligament (Fig.5)

Less well-defined than the others, springs from the ischial wall of the acetabulum on the posterior and lower aspect of the joint. The upper fibres pass horizontally across the back of the joint, the lower ones ascend spirally; both sets of fibres converge on the upper and lateral part of the femoral neck where they are attached medial to the root of the greater trochanter (Romanes, 1981).

(3) The iliofemoral ligament : (Fig-4)

It is of great strength and considerable thickness; it is a triangular band attached proximally by its apex to the lower part of the anterior inferior iliac spine and adjoining part of the acetabular rim, and distally by its base to the intertrochanteric line. It occupies all the front of the capsule except at the medial side above. The sides of triangular ligament which are stronger than the middle part, diverge below from a common stem above. This gives the ligament the appearance of an inverted Y. The upper or lateral of the two diverging bands is attached distally to a special tubercle on the front of the greater trochanter at the upper end of the intertrochanteric line. In full

extension of the hip the iliofemoral ligament becomes taut (Romanes, 1981).

(4) The transverse acetabular ligament : It is formed by the acetabular labrum as it bridges the acetabular notch. The ligament converts the notch into a tunnel through which the blood vessels and nerves enter the joint (Snell, 1986).

(5) The ligament of the head of the femur:- (Fig-6)

It is flat and triangular in shape. It is attached by its apex to the pit on the head of the femur (Fovea capitis) and by its base to the transverse ligament and the margins of the acetabular notch. It lies within the joint and is ensheathed by synovial membrane (Snell, 1986).

It is unable to exert a restricting function despite reaching a state of tension in extreme adduction (Fuss and Bacher, 1991).

Coaptations of the articular surface of the hip:-

The labrum acetabular widens and deepens the acetabulum so that the acetabular cavity exceeds a hemisphere. The Fibrocartilagenous labrum holds the femoral head. This fibrous interlocking is further enhanced by the zona orbicularis of the capsule which encircles the femoral head. Atmospheric pressure plays an important part in maintaining a position of the articular surfaces. The ligaments and the periarticular muscles play a vital part in the maintenance of the structural integrity of the joint. The action of the ligament varies according to the position of the hip, in the erect position the ligaments are under tension and are efficient in securing coaptation; in flexion the ligaments are relaxed. Therefore, the position of flexion is a position of instability (Kopandjj, 1981).

Synovial membrane and bursa

This lines the capsule and is attached to the margins of the articular surfaces. It covers the portion of the neck of the femur that lies with the joint capsule. It ensheathes the ligaments of the head of the femur and covers the pad of fat contained in the acetabular fossa. A pouch of synovial membrane frequently protrudes through a gap in the anterior wall of the capsule, between the pubofemoral and iliofemoral ligaments and forms the psoas bursa beneath the psoas tendon (Snell, 1986).

Relations (Fig-7)

The hip joint is surrounded by muscles:

- * Anteriorly iliopsoas and pectineus, together with the femoral artery and vein.

- * Laterally-tensor fasciae latae, gluteus medius and minimus.

- * Posteriorly-the tendon of obturator internus with the gemelli, quadratus femoris, the sciatic nerve and more superficially, gluteus maximus.

Superiorly-the reflected head of rectus femoris lying in contact with the joint capsule.

Inferiorly-the obturator externus, passing back to be inserted into the trochanteric fossa (Ellis, 1992).

Blood Supply: (Fig.8 and Fig.9)

Capsule and synovial membrane are supplied by nearby vessels, the head and intra-capsular part of the neck have two sources:-

- (1) Ligament of the head of the femur has an arterial twig from the obturator artery that supplies the ligament and major part of the head in young