Role of Magnetic Resonance Imaging in evaluation of adult non-traumatic painful hip

Thesis

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Mariam Tharwat Thabit

Dedication

I dedicate this work with sincere thanks and appreciation to ***My Father and Mother,*** *for their constant support.*

✍ *Mariam Tharwat Thabit*

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List of Abbreviations

Abbr.	Full-term
AVN	**:** Avascular necrosis.
FAI	**:** Femoroacetabular impingement.
FOV	**:** Field of view.
GVHD	**:** Graft-versus-host reaction.
ITOH	**:** Idiopathic transient osteoporosis of the hip.
MRI	**:** Magnetic resonance imaging
MRV	**:** Magnetic resonance venography.
MTS	**:** MayeThuner Syndrome.
OA	**:** Osteoarthritis.
PDFS	**:** Proton density fat supression.
PVNS	**:** Pigmented villonodular synovitis.
RA	**:** Rheumatoid arthritis.
SLE	**:** Systemic Lupus Erythematous.
SOC	**:** Synovial osteochondromatosis.
STIR	**:** Short time inversion recovery.
T1WI	**:** T1 weighted imaging.
T2WI	**:** T2 weighted imaging.
TE	**:** Echo time.
TR	**:** Repetition time.
TSE	**:** Turbo spin echo.

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Introduction

Hip joint is a major weight-bearing joint with significant mobility. Hip pain in non-traumatic cases is a non-specific symptom occurring in 14% of the population over 60-year age **(Battaglia et al., 2016).** There are different etiologies for hip pain either articular or extra-articular **(Reddy, 2017)**.

In adults, intraarticular causes may include avascular necrosis, arthritis, loose bodies, tendonitis and bursitis, while extra-articular causes may include referred pain from lumbar spine, sacroiliac joint and nerve entrapment syndromes **(Drar et al., 2014).**

Normal appearing radiographs, non-reliable history and clinical findings forms a difficult diagnostic dilemma. Many conditions as trauma, infection, arthritis, avascular necrosis, tumor, and hip dysplasia can manifest with non-significant radiographic findings **(Kalekar et al., 2017).**

Here comes the importance of Magnetic Resonance as a non-invasive diagnostic imaging modality for characterizing hip anatomy and pathology. Magnetic resonance imaging (MRI) advantage is helping in accurately detection, localization, and characterization of hip pathology, which leads to improve diagnosis and proper managing of different intra-articular and extra-articular pathologies of hip pain **(Omar et al., 2015), (Gold et al., 2012).**

Aim of the Work

The purpose of our study is to assess the role of Magnetic Resonance Imaging as a non-invasive diagnostic modality in adult patients with non-traumatic painful hip joint.

Anatomy of hip joint

Hip joint is a ball and socket joint where the femoral head forms the ball and the acetabulum forms the socket.

Acetabulum is covering the femoral head all around except inferiorly at the acetabular notch.

The acetabular cup is oriented anteriorly, inferiorly and laterally, directly facing the femoral head which is oriented superiorly and medially which helps in the stability configuration of the hip joint **(Mary et al., 2013).**

Articulating surface:

1) The acetabulum: formed of union of all 3 pelvic bones: the ilium, ischium, and pubis that meet at a "Y" shaped cartilage. The triradiate cartilage is fused at 12 to 16 years age **(Mary et al., 2013).**

The acetabular articular surface is an incomplete cartilaginous ring on the head of the femur, thicker at the center than that on the circumference, covers the entire surface with the exception of the fovea capitis fermoris, to which the ligamentum teres is attached **(fig. 1) (Ludwig et al., 2003).**

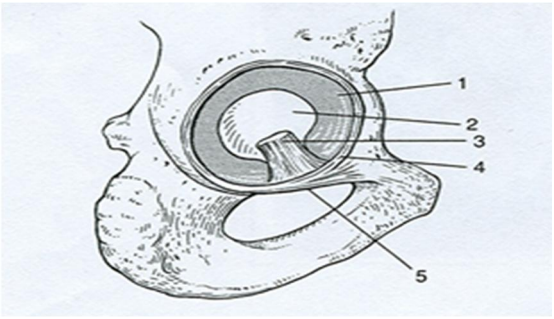

Figure (1): The acetabulum: 1, articular cartilage; 2, acetabular fossa; 3, ligamentum teres; 4, labrum acetabulare; 5, transverse acetabular ligament (**Ludwig et al., 2003).**

The labrum serves to deepen the acetabulum and acts as a bolster support to the femoral head **(Seidenberg, 2010).**

The center of the acetabulum (the non-articular part) is occupied by a pad of fat known as Haversian pad **(Jomaah and Laredo, 2002).**

Radiological anatomy of the acetabulum:

On MRI the acetabulum appears like a cup containing the femoral head. Ligament teres is located centrally within acetabulum with fat surrounding it **(fig. 2) (David et al., 2004).**

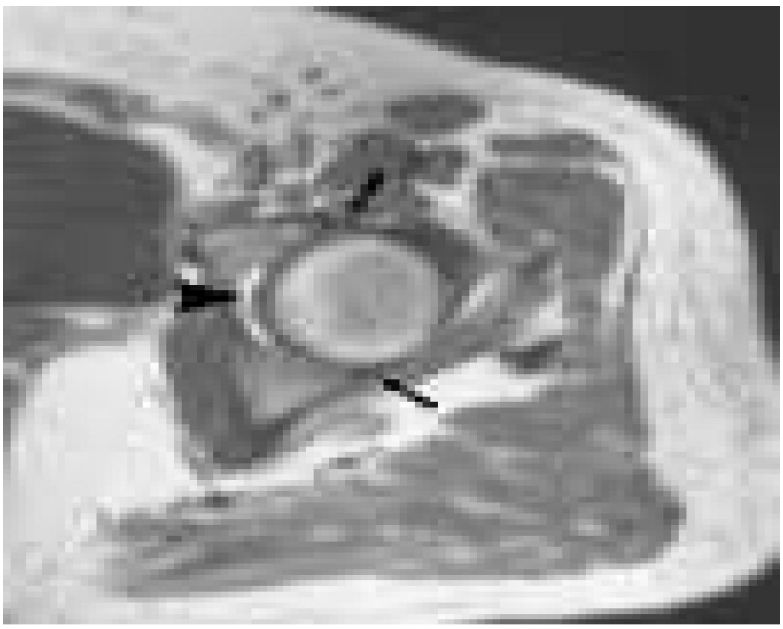

Figure (2): Normal adult hip.Axial T1-weighted. Its anterior and posterior rims are clearly defined (arrows). Centrally located within acetabulum is fat surrounding the ligamentum teres (arrowhead) **(David et al., 2004).**

-Axial images: at the level of the acetabular roof, muscles of the hip demonstrate intermediate signal intensity on T1-weighted image. The gluteal muscles can be differentiated from one another by high signal intensity fat along fascial division. The low signal tendon of the rectus femoris blends with the low signal cortex of the anterior inferior iliac spine. The tendon of the reflected head of the rectus femoris muscle is anterior to the iliofemoral ligament and follows the contours of the lateral acetabulum. The obturator internus muscle is visualized medial to the anterior and posterior acetabular column **(fig. 3, 4) (David et al., 2004).**

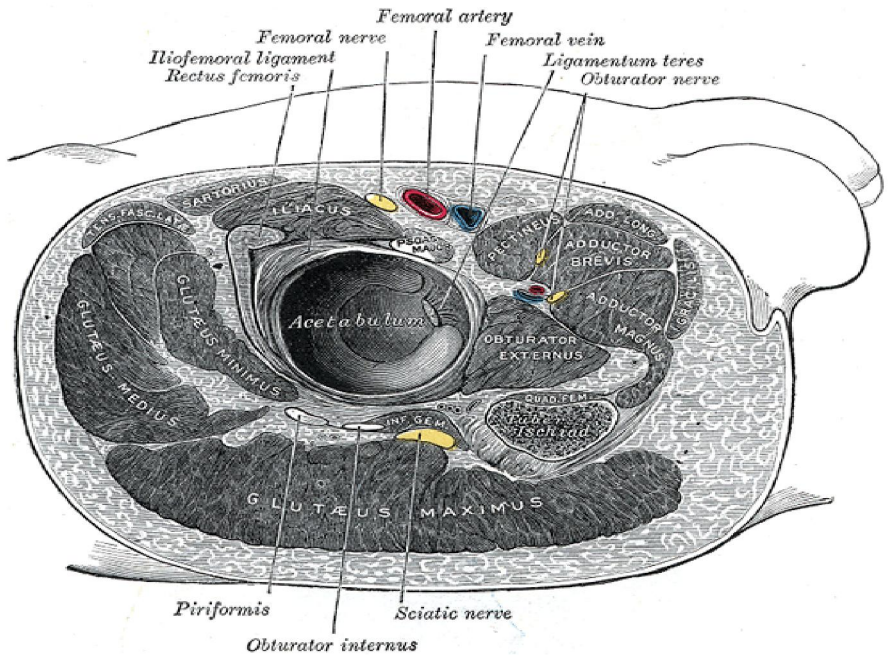

Figure (3): A cross sectional anatomy of the hip joint surrounding muscles **(Ludwig et al., 2003).**

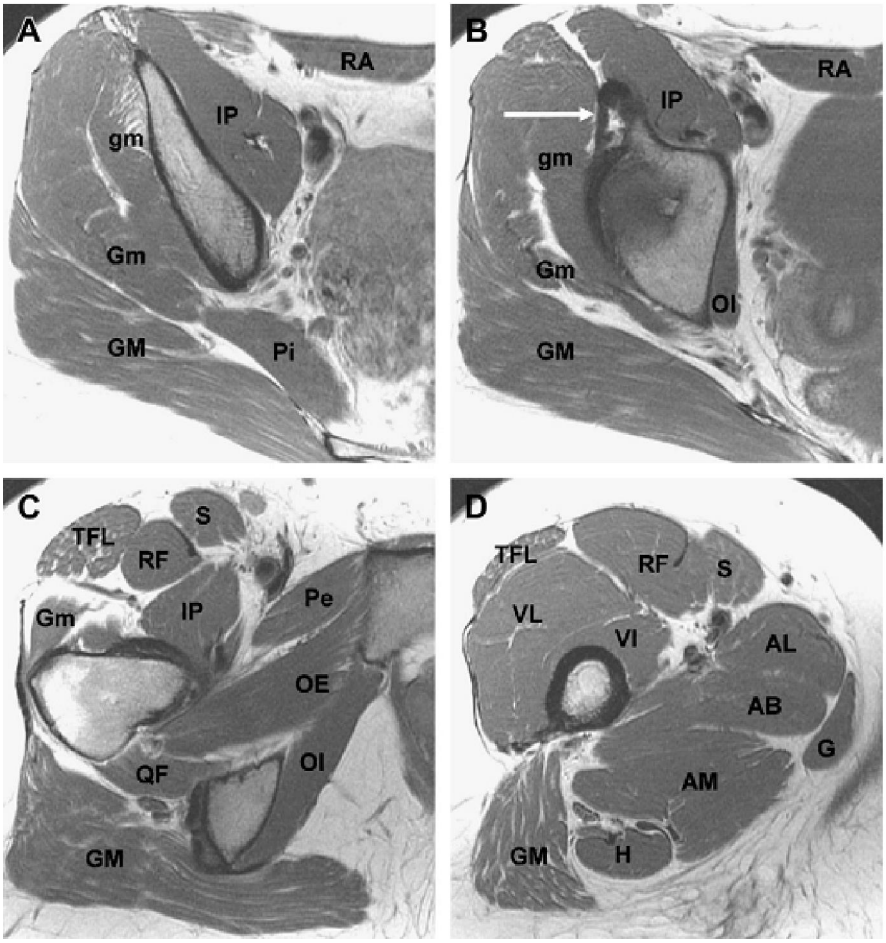

Figure (4): (A–D) axial proton density weighted MR images from superior to inferior demonstrate: AB, adductor brevis; AL, adductor longus; AM, adductor magnus; G, gracilis; gm, gluteus minimus; Gm, gluteus medius; GM, gluteus maximus; H, hamstrings; IP, iliopsoas; OE, obturator externus; OI, obturator internus; Pe, pectineus; Pi, piriformis; QF, quadratus femoris; RA, rectus abdominis; RF, rectus femoris; S, sartorius; TFL, tensor fascia lata; VI, vastus intermedius; VL, vastus lateralis. (B) Reflected head of the rectus femoris (arrow), which attaches to the superolateral aspect of the acetabulum **(connie and Ambrose, 2013).**