Al-Mustaqbal University
College of Health and Medical Technologies
Radiological Techniques Department

Magnetic Resonance Imaging

First Semester

Lecture 25 : MRI of the hip joint

By

Dr. Mohanad Ahmed Sahib
MSc. Ph.D. Radiology technology

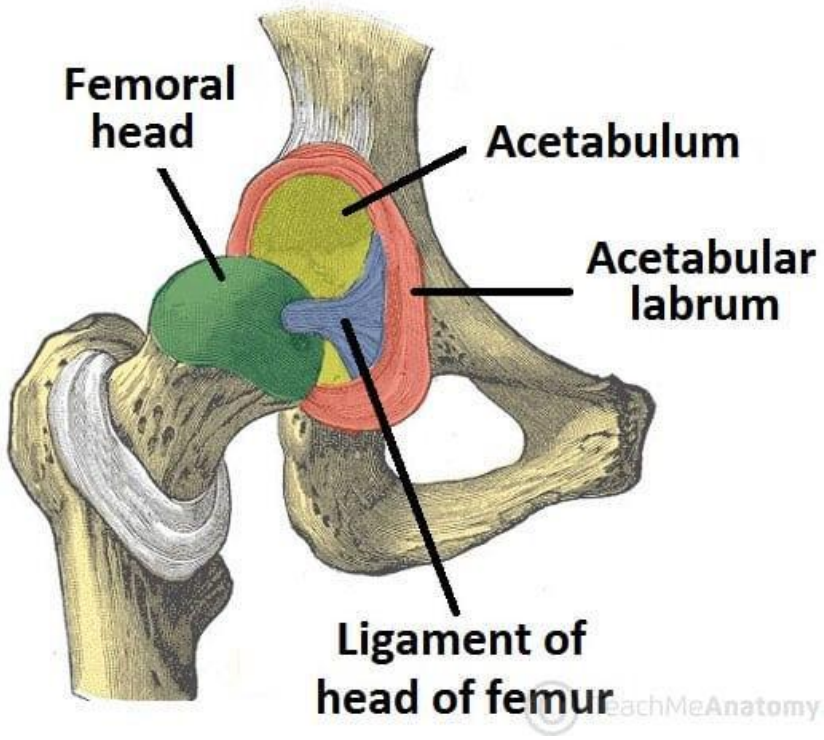
2025/2024

Introduction :

An MRI is a good tool for evaluating the many causes of pain that may surround the hip joint itself. There are several tendons that insert around the hip and that can become **inflamed or degenerated.** **Bursitis**, usually located at the outside (lateral) part of the hip, can be **painful**. In addition, if you have had a recent injury or engaged in excessive athletic activity, your muscles can become injured (known as a "muscle strain") and this can be detected by MRI.

•Anatomical overview:

The hip joint **is a ball and socket synovial joint**, formed by an articulation between **the pelvic acetabulum and the head of the femur.** The acetabulum is a cup-like depression located on the **inferolateral aspect of the pelvis.** Its cavity is deepened by the presence of a fibrocartilaginous collar – the **acetabular labrum**. The head of femur is hemispherical, and fits completely into the concavity of the acetabulum. (fig.1)



(Fig.1) The articulating surfaces of the hip joint – pelvic acetabulum and head of the femur.

•**The MRI hip protocol** encompasses a set of different MRI sequences for the routine assessment of the single hip joint.

•Indications:

1-osteonecrosis of the hip.

Osteonecrosis of the hip, also known as avascular necrosis (AVN), is a condition characterized by the death of bone tissue due to a lack of blood supply. This condition can lead to the collapse of the femoral head (the ball of the hip joint), resulting in pain, reduced mobility, and potentially arthritis.

2-femoral insufficiency or stress fracture.

3-different forms of hip impingement.

Definition: Abnormal contact between the femoral head and acetabulum, leading to pain and restricted motion.

4-labral and/or chondral injury.

Definition: Damage to the acetabular labrum or cartilage, often due to impingement or trauma.

5-trochanteric syndrome.

Definition: Inflammation of the structures around the greater trochanter.

6-rectus femoris injury.

Definition: Strain or tear of the rectus femoris muscle, part of the quadriceps group.

7- hip osteoarthritis, MRI can show joint narrowing, subchondral sclerosis (increased white/blight location surrounding the joint), and osteophyte formation

Condition	T1 MRI Appearance	T2 MRI Appearance
Osteonecrosis of the Hip	Hypointense areas; double-line sign	Hyperintense necrotic area
Femoral Insufficiency/Stress Fracture	Hypointense fracture line	Hyperintense edema at fracture site
Hip Impingement	Hypointense cam lesions; rim changes	Hyperintense lesions/tears
Labral/Chondral Injury	Irregular hypointense areas	Hyperintense fluid around injuries
Trochanteric Syndrome	Hypointense signals in tendons	Hyperintense edema/fluid
Rectus Femoris Injury	Hypointense muscle injury	Hyperintense edema in muscle

•MRI procedure (hip joint)

•Patient position:

1-Place **the pelvic array coil** on the table.

2-Place **the patient supine, feet first**, with the legs extended and straight.

3-Place the patient's arms at the sides or resting on the abdomen, but not on the pelvis.

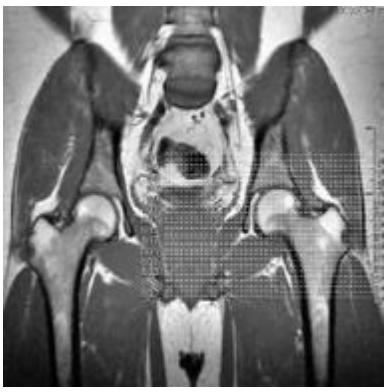
4-Position comfort cushions at any pressure points.

5-If necessary, use patient straps to immobilize the patient and provide support for the arms. Tape the feet together so the legs and hips are immobilized. (Fig.2)

(Fig.2) Patient position-hip joint

•Scout slice placement:

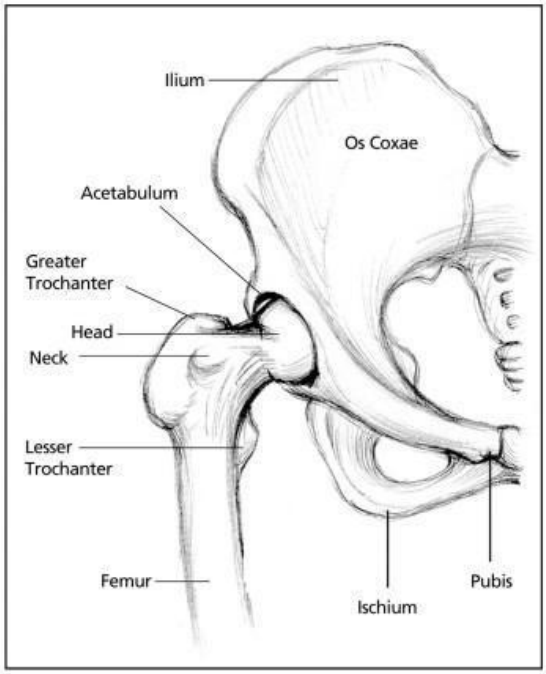
1-Coronal localizer for axial slice



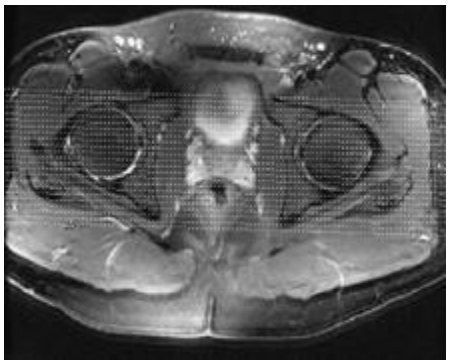
-Slice Acquisition: Superior To Inferior.

- Slice Alignment: Parallel To The Femoral Heads.

-Anatomic Coverage: Iliac fossa to proximal femur, including the lesser trochanter.



2-Axial localizer for coronal slice

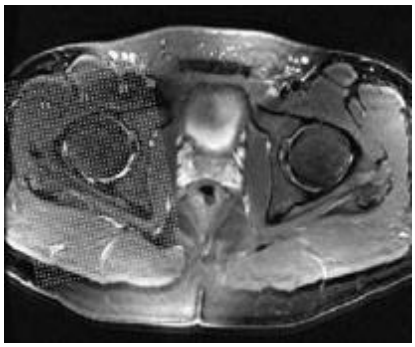


-Slice Acquisition: Anterior To Posterior.

-Slice Alignment: Parallel To Femoral Heads.

- Anatomic Coverage: Pubis to posterior ischium.

3-Axial localizer for sagittal slice



-Slice Acquisition: **Lateral To Medial.**
-Slice Alignment: **Parallel To The Labrum Of The Acetabulum.**
- Anatomic Coverage: **Greater trochanter to the superior pubic ramus.**

•MRI Sequences

Sequence	TR	TE	FA	ETL	Slice thickness
Axial (T1) FSE	525	10-20	-	4	4mm
Coronal (T1) FSE	350	10-20	-	4	4mm
Sagittal (T2) FSE	3400	60	-	23	4mm
Axial (T2) FSE	3400	60	-	13	4mm
Axial (PD) (FS)	3500	20	-	7	4mm

Proton Density (PD)-Weighted Imaging:

Use: Provides intermediate contrast between T1 and T2 and is useful for evaluating soft tissue structures in the hip. including the labrum tendons, and ligaments.