



A STUDY ON ROLE OF MRI IN EVALUATING PAINFUL HIP JOINT AT A TERTIARY CARE HOSPITAL

Radio-Diagnosis

**Dr Chintala
Cheruvu Naga
Praneetha**

Junior Resident, Department Of Radio Diagnosis, Pes Institute Of Medical Sciences And Research, Kuppam, Andhra Pradesh - 517425

**Dr R Ramesh
Kumar**

Professor, Department Of Radio Diagnosis, Pes Institute Of Medical Sciences And Research, Kuppam, Andhra Pradesh - 517425

ABSTRACT

Objectives: Hip pain can be diagnostic challenge for the clinician. Our study aimed to access the Role of Magnetic Resonance Imaging (MRI) in diagnosing hip pathologies. **Methods and materials:** This study was retrospective study done on 55 patients referred to Department of Radiodiagnosis, PESIMSR, Kuppam, Andhra Pradesh, India. All 55 patients were subjected to MRI hip study using T1, T2, STIR and PD FS sequences. Data collected was tabulated and statistical analysis was done. **Results:** Out of 55 patients, 47 patients showed abnormality and 8 patients had no abnormality detected. **Conclusion:** MRI is the modality of choice for the diagnosis of hip joint pain as it is safe, non-invasive and depicts accurate anatomical details. MRI is an excellent modality for the diagnosis of many hip conditions which shows non remarkable subtle findings in radiographs and CT.

KEYWORDS

MRI, Hip joint, AVN

INTRODUCTION

Hip joint is ball and socket type of joint with complex articulation and is seen involved by various pathological conditions. Hence early diagnosis and characterization plays important role in proper management and follow up of the disease. In-depth research has been done on the function of MRI in AVN, and it has been demonstrated to be a crucial modality in the diagnosis of the disease's early phases, where a radiograph is unambiguous^{9,10}. MRI is a useful tool for detecting hidden bone and cartilage injuries such as stress fractures, hidden fractures, infections, and musculoskeletal neoplasms¹¹.

Main differential diagnosis of hip pain includes:

1. Avascular necrosis of femoral head
2. Arthritis - Infective and Degenerative
3. Osteomyelitis
4. Femoro-acetabular impingement
5. Stress fracture
6. Sacroiliitis
7. Malignancy
8. Muscular causes

Imaging of the hip joint plays vital role in the evaluation of hip pain. Radiographs are still the primary method of examination since they are crucial for learning about the osseous architecture, but they are not always able to analyse other important anatomical structures in-depth or identify disorders in their early stages. Bony pathology can be clearly shown by CT scan, although not as quickly as MRI. Radiation is another drawback of CT scans, yet they are particularly effective in showing bone overgrowth or calcified tumours. Although sensitive, radionuclide imaging of a painful hip lacks specificity for increased isotope uptake, making it impossible to pinpoint the precise type and extent of the pathology. MRI is frequently used in conjunction with bone scintigraphy and CT scanning to solve medical problems due to the fact that many degenerative hip problems can be diagnosed by MRI early on.

MATERIALS AND METHODS

A retrospective study was conducted among 56 patients referred to the department of Radio diagnosis, PES Institute of Medical Sciences and Research, Kuppam with a clinical history of hip pain and inconclusive diagnosis on plain radiographs were subjected to the study. Informed consent was taken from all the patients. MR Imaging was done with a 1.5 Tesla super conductive scanner (GE). Bilateral hips are examined simultaneously in supine position. Coronal sections with 3-5mm thickness and axial and sagittal sequences with 5 -8 mm thickness of following sequences were taken,

- 1) T1weighted,
- 2) T2weighted,

- 3) Proton density fat saturation (PDFS)
- 4) Short tau inversion recovery (STIR). T1W, T2W, PDFS

Field of view was 350 to 400 in adult and 160 to 180 in children.

Study design: Retrospective study.

Study location: This study was done in the department of Radiodiagnosis, PESIMSR, Kuppam.

Study duration: January 2020 to September 2022.

Sample size: 55 patients.

Inclusion criteria:

The study included patients of all age groups presenting with acute or chronic hip pain.

Exclusion criteria:

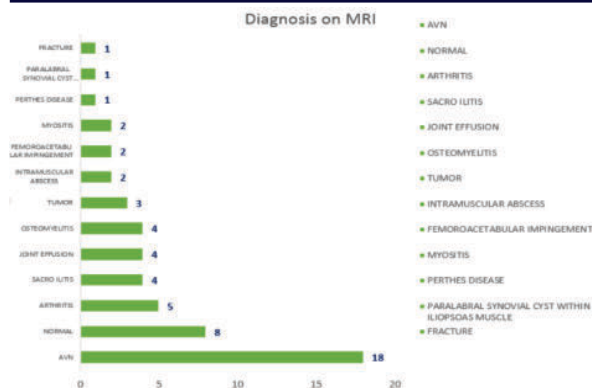
The study excluded patients with a previous history of hip surgery.

RESULTS

Our study included 55 patients with history of painful hip joint. The age of the patients was ranging from 5 years to 66 years. The maximum number of patients 14 (25.5%) belongs to the age group of 30-39 years. Out of patients with hip pain complaints, MRI of 8 cases was normal. Rest 47 patients showed various abnormalities on MRI scan. The study shows AVN as the most common pathology of hip joint accounts for 18 (32.7%) cases. Unilateral AVN is seen in 9 patients and bilateral AVN is seen in patients 9.

Table 1 – Showing diagnosis on MRI in patients presented with hip pain

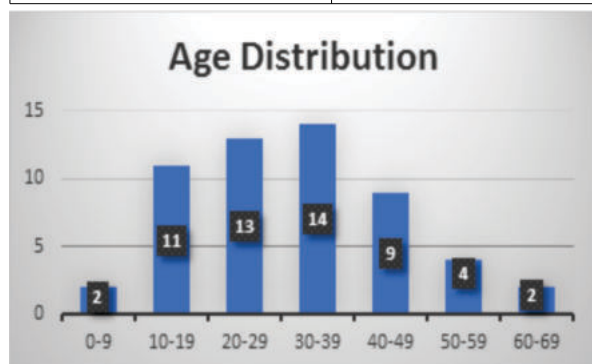
Diagnosis on MRI	Number of cases
Avascular necrosis	18
Arthritis	5
Sacroiliitis	4
Joint effusion	4
Osteomyelitis	4
Tumor	3
Intramuscular abscess	2
Femoroacetabular impingement	2
Myositis	2
Perthes disease	1
Para labral synovial cysts	1
Fracture	1
Normal	8
Total	55



Graph 1 – Showing various causes of Hip pain in patients of our study

Table 2 – Showing Age distribution

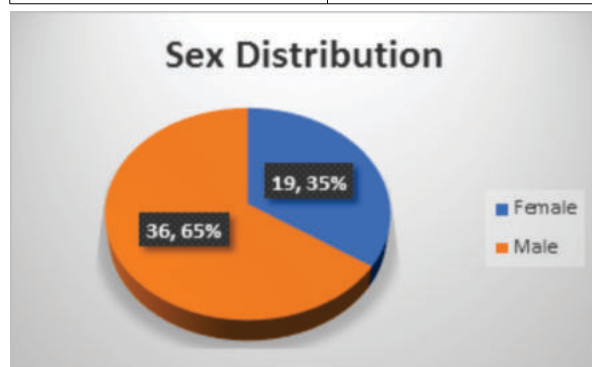
Age distribution	Number of cases
0-9	2
10-19	11
20-29	13
30-39	14
40-49	9
50-59	4
60-69	2
Total	55



Graph 2 – Showing Age distribution

Table 3 – Showing sex distribution

Sex distribution	Number of cases
Male	36
Female	19
Total	55



Graph 3 – Showing Sex distribution

Table 4 – Showing side distribution

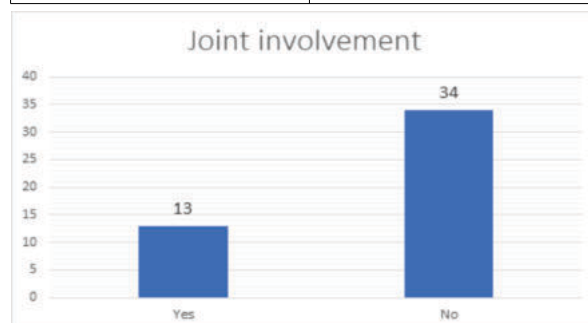
Side distribution	Number of cases
Unilateral	Left: 14, Right: 16
Bilateral	17
Total	47



Graph 4 – showing unilateral, bilateral involvement of hip joints

Table 5: showing number of cases with joint involvement

Joint space involvement	Number of cases
Yes	13
No	34



Graph 5: showing number of cases with joint involvement

DISCUSSION

Common findings of MRI of painful hip joint are discussed below.

1. Avascular necrosis of femoral head
2. Arthritis - Infective and Degenerative
3. Osteomyelitis
4. Femoroacetabular impingement
5. Stress fracture
6. Sacroiliitis
7. Malignancy
8. Muscular causes

Avascular Necrosis

MRI is an excellent modality for the diagnosis of AVN. MRI helps in the early diagnosis and accurate staging of AVN with clear depiction of size of the lesion. This study shows avascular necrosis as the most common pathology of hip pain 18 (32.7%). In the study done by Jacobs B et al¹, alcohol was the commonest risk factor, seen in 39% of cases. Kamal D et al⁸ concluded smoking is the commonest risk factor in her study which contributed to 36.9% of cases. In our study, unilateral AVN was seen in 9 patients and bilateral AVN in 9 patients. A study by Drar HA et al², shows unilateral AVN in 68% and bilateral AVN in 32% of patients. Unilateral AVN is likely seen due to local cause for vascular compromise and bilateral AVN is likely seen due to systemic cause.

Osteoarthritis

MRI findings of osteoarthritis include nonspecific joint effusion, diffuse bone marrow oedema, subchondral insufficiency fractures at the weight bearing area, subchondral cyst like lesions, femoral head flattening, epiphyseal low signal intensity lines. We had 5 patients of osteoarthritis in our study presenting with hip pain. Bone marrow oedema and joint effusion were present in all the patients.

Fractures

Deutsch AL et al³ have reported that T1-weighted coronal images of MRI can accurately depict occult hip fractures. Stress fractures and non-displaced subtle fractures are very difficult to appreciate on radiographs but can be easily recognized on MRI images on STIR or fat suppressed T2 weighted sequences due to marrow oedema^{3,4}. In our study, 1 patient had femur neck fractures.

Sacroiliitis

MR imaging findings of sacroiliitis includes bone marrow oedema, articular cartilage changes, narrowing of joint space, cortical erosions. We had 4 patients of sacroiliitis, with bilateral involvement. One of the patients had secondary hip osteoarthritis.

Infective arthritis

In his study, Michael Karchevsky M et al⁵, has described MRI findings of infective arthritis, which includes synovial thickening and enhancement, joint effusions, peri synovial bone oedema, fluid out pouching and enhancement of adjacent soft tissue. In our study, 5 cases of infective arthritis were detected. MRI findings of these cases includes bone marrow oedema, joint effusion, synovial thickening and contrast enhancement of synovium (50%).

Metastatic lesion

As MRI can detect early bone marrow abnormalities, it is more sensitive than nuclear bone imaging in the detection of bone metastasis⁶. We had two patients with metastatic lesions presenting with hip pain. Lesions are T1 hypointense, T2, STIR hyperintense and shows enhancement on contrast study.

Intramuscular Abscess

We had 2 patients of intramuscular abscess with hip joint pain. The patient had well defined collection in the left Gluteus Medius muscle with necrotic centre and thick enhancing wall.

Femoroacetabular Impingement

Pincer and cam are the two types of Femoroacetabular impingements. In Pincer impingement femoral head will be overcovered by acetabulum. In Cam impingement femoral head is in aspherical shape due to bony protrusion at the femoral head-neck junction⁷. Our study shows one patient with CAM type of Femoroacetabular impingement and one patient with Pincer type of Femoroacetabular impingement. A small bony protrusion is noted over the femur neck with intra substance tear of superior labrum. Alpha angle was around 64 degrees.

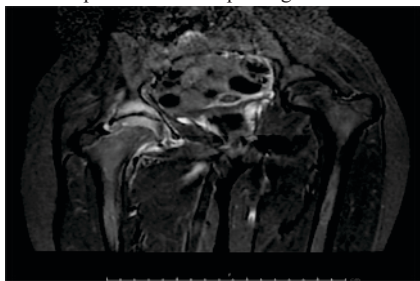


Figure 1: Case of Septic arthritis. STIR coronal image showing hyperintense signal involving subchondral areas of femoral head and acetabulum on right side

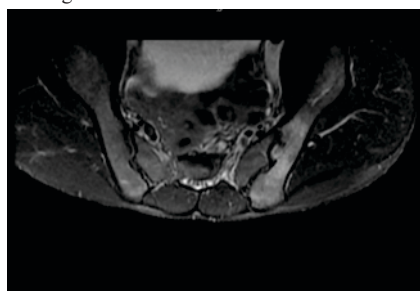


Figure 2: Case of Sacroiliitis. STIR axial image showing hyperintense signal involving iliac aspect of left Sacroiliac joint

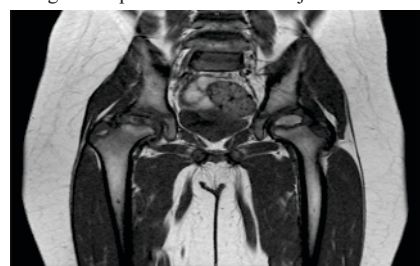


Figure 3: Case of Perthes' disease. Coronal T1 image showing

collapsed right femoral epiphysis in young patient.

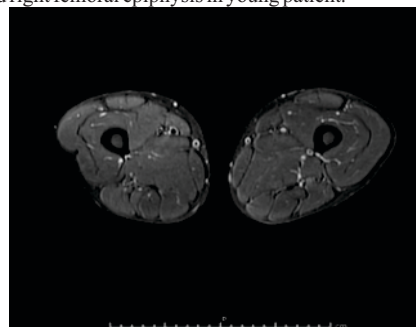


Figure 4: Case of Myositis. STIR axial image showing mildly bulky with increased STIR signal involving anteromedial group of muscles on right side

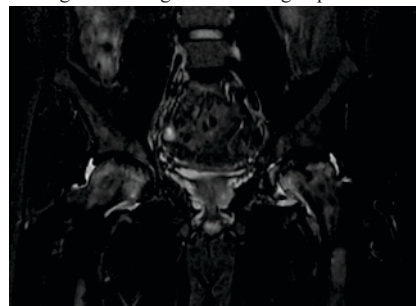


Figure 5: Bilateral AVN of Femoral head: STIR coronal image showing loss of contour of both femoral heads with increased heterogeneous signals

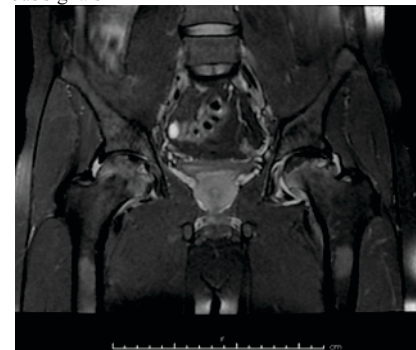


Figure 6: Coronal PD FS image showing case of Bilateral AVN of Femur

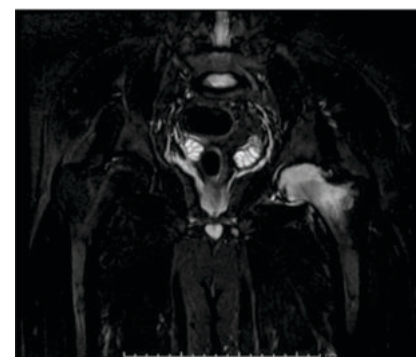


Figure 7: Case of Unilateral AVN on left side. Coronal STIR image showing increased signal intensity in femoral head and neck. However Femoral head contour is maintained

CONCLUSION:

For the safe and non-invasive diagnosis of various diseases of the hip joint, MRI is a useful imaging technique. MRI continues to be the modality of choice for the diagnosis of joint diseases, synovial alterations, bone marrow abnormalities, articular cartilage pathologies, and muscle abnormalities due to its better soft tissue contrast and resolution. This study demonstrates the value of MRI in assessing hip joint diseases and assisting the doctor in making an appropriate diagnosis.

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