Original Research Article

A study of assessment of the severity and extent of the underlying lesion in various conditions of painful hip joint

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Abstract

Background: since from the invention of it MRI has become one of the most powerful imaging tools for musculoskeletal imaging. Painful hip is one of the common clinical problem which requires imaging in addition to clinical examination. **Aims and Objectives:** To study severity and extent of the underlying lesion in various conditions of painful hip joint**. Methodology:** The present study was cross sectional study, undertaken to estimate the role of MRI in early evaluation of painful hip joints in a tertiary care centre. The present study period was from December 2016 to October 2018. The study population was referred to Department of Radiology- both indoor and outdoor patients with hip joint pain. A total sample size of 50 patients with hip joint pain referred to department of Radiology. Collected data was presented in the form of tables and diagrams. Frequency and percentages were calculated wherever applicable. **Result:** It was observed that majority of patients were in age group 31-40 years (36%).It was observed that majority of patients were in male (66%) and females were 34%.in avascular necrosis among patients. It was observed that majority of patients showed focal subchondral signal abnormality (100%) followed by double line sign (75%) .In osteoarthritis among patients. It was observed that majority of patients showed joint effusion (100%) followed by synovial thickening (71.42%). In septic arthritis among patients. It was observed that majority of patients showed altered soft tissue intensity (100%),synovial thickening (50 %). In transient arthritis among patients. It was observed that majority of patients showed altered soft tissue intensity (50%), synovial thickening (50%) .In chondroblastoma patients. It was observed that majority of patients showed low signal intensity foci with in tumor (100%),In osteoporosis among patients. It was observed that majority of patients showed marrow edema of femoral head and neck (100%) followed by joint effusion (75%) **Conclusion:** It was observed that MRI was very useful in the assessment of the severity and extent of the underlying lesion in various conditions of painful hip joint.

Key words: avascular necrosis of Femur (AVN), osteoarthritis, septic arthritis, transient arthritis, chondroblastoma

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INTRODUCTION

Since from the invention of it MRI has become one of the most powerful imaging tools for musculoskeletal imaging. Painful hip is one of the common clinical problem which requires imaging in addition to clinical examination. Magnetic resonance imaging is the imaging modality which is commonly used due to its excellent soft tissue contrast with high spatial resolution and provides excellent details of cartilage, joint fluid, extraarticular soft tissues and osseous structures.[1] MRI allows the joint to be visualized as a whole organ and provides much more detailed picture of the OA changes than any other imaging modality without any radiation. MRI has unlimited image

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contrast possibilities, and contrast-enhanced imaging provides additional information about synovitis. [2] Disadvantages of MRI include the high price compared with CR, long acquisition time and contraindications to the procedure. MRI is contraindicated in patients with aneurysm clips, pacemakers, cochlear implant and metallic splinters in the eye. The MRI equipment is expensive to purchase, maintain and operate. Experts are needed for input on the selection of sequences and correct utilization, and the readers must be aware of artifacts during the interpretation of images. [2,3,4] Gadolinium (Gd) contrast may lead to nephrogenic systemic fibrosis and should not be administrated to persons with reduced kidney function. It typically manifests with skin tightening, tethering and hyperpigmentation, and systemic fibrosis of internal organs has been identified due to deposition of free Gd in the tissues. [40] With all these advantages and limitations we have studied the severity and extent of the underlying lesion in various conditions of painful hip joint at tertiary health care centre.

METHODOLOGY

The present study was cross sectional study, undertaken to estimate the role of MRI in early evaluation of painful hip joints in a tertiary care centre. The present study period was from December 2016 to October 2018. The study population was referred to Department of Radiology- both indoor and outdoor patients with hip joint pain. A total sample size of 50 patients with hip joint pain referred to department of Radiology in the hospital was included in the study population.Patients presenting with acute or chronic hip pain, Patients of all age groups included into study. Patients with history of acute trauma, malignant lesions. Patient having history of metallic implants insertion, cardiac pacemakers and metallic foreign body in situ Patient with congenital abnormality were excluded from the study. The questionnaire was validated by translation into the local language and reviewed by a group of experts. Imaging was done with 1.5 Tesla Philips Machine using abdominal surface coils and spine coils. The following sequences was selected as required: a) T1W1, T2W1 (Axial, Sagittal) , b) STIR – Coronal , c) PD – (Axial, Coronal) ,d) Contra study if required . MRI features of the hip joint (such as -size, shape, margin of lesions, presence and absence of calcification) were recorded. Any other complication will be noted and appropriately treated. All data analysis has been done by using SPSS (version 22) for windows. Collected data was presented in the form of tables and diagrams. Frequency and percentages were calculated wherever applicable.

RESULT

Table 1: Distribution according to age

Age group (years)	No of patients	Percentage
<10	01	02.00
10-20	03	06.00
21-30	06	12.00
31-40	18	36.00
41-50	13	26.00
51-60	06	12.00
>60	03	06.00
Total	**50**	**100**

The above table shows distribution of patients according to age. It was observed that majority of patients were in age group 31-40 years (36%) followed by 41-50 years (26%) The mean age of the patients was 41.26 ±09.85 years.

Table 2: Distribution according to sex

Sex	No of patients	Percentage
Male	33	66.00
Female	17	34.00
Total	**50**	**100**

The above table shows distribution of patients according to sex. It was observed that majority of patients were in male (66%) and females were 34%.

Table 3: Distribution according to MRI findings in AVN

MRI findings	No of patients (n=16)	Percentage
Focal subchondral signal abnormality	16	100.00
Double line sign	12	75.00
Marrow edema	07	43.75
Joint effusion	06	37.50

The above table shows MRI findings in avascular necrosis patients. It was observed that majority of patients showed focal subchondral signal abnormality (100%) followed by double line sign (75%) The other findings includes marrow edema (43.75%) and joint effusion (37.5%)

Table 4: Distribution according MRI findings in Osteoarthritis

MRI findings	No of patients (n=7)	Percentage
Joint space narrowing	04	57.14
Marginal osteophytes	04	57.14
Subchondral cyst	05	57.14
Marrow edema	05	71.42
Joint effusion	07	100.00
Synovial thickening	05	71.42
Soft tissue edema	03	42.86

The above table shows MRI findings in osteoarthritis patients. It was observed that majority of patients showed joint effusion (100%) followed by synovial thickening (71.42%) The other findings includes marrow edema (71.42%), subchondral cysts (57.14%), joint space narrowing (57.14%), marginal osteophytes (57.14%) and soft tissue edema (42.86%)

Table 5: Distribution according to MRI findings in septic arthritis

MRI findings	No of patients (n=4)	Percentage
Altered soft tissue signal intensity	04	100.00
Synovial thickening	02	50.00
Marrow edema	04	100
Joint effusion	03	75

The above table shows MRI findings in septic arthritis patients. It was observed that majority of patients showed altered soft tissue intensity (100%), synovial thickening (50 %) The other findings includes marrow edema (100%) and joint effusion (75%)

Table 6: Distribution according to MRI findings in Transient arthritis

MRI findings	No of patients (n=4)	Percentage
Altered soft tissue signal intensity	2	50.00
Synovial thickening	2	50.00
Marrow edema	0	00
Joint effusion	2	50

The above table shows MRI findings in transient arthritis patients. It was observed that majority of patients showed altered soft tissue intensity (50%), synovial thickening (50%) The other findings includes marrow edema (0%) and joint effusion (50%)

Table 7: Distribution according to MRI findings in Chondroblastoma

MRI findings	No of patients (n=2)	Percentage
Low signal intensity foci with in tumor	2	100.00
Marrow edema	2	100.00

The above table shows MRI findings in chondroblastoma patients. It was observed that majority of patients showed low signal intensity foci with in tumor (100%), marrow edema (100%)

Table 8: Distribution according MRI findings in Osteoporosis

MRI findings	No of patients (n=4)	Percentage
Marrow edema of femoral head and neck	04	100.00
Joint effusion	03	75.00
Marrow edema of the acetabulam	02	50.00

The above table shows MRI findings in osteoporosis patients. It was observed that majority of patients showed marrow edema of femoral head and neck (100%) followed by joint effusion (75%) and marrow edema of the acetabulam (50%)

DISCUSSION

Magnetic resonance imaging (MRI) with its excellent soft tissue contrast and resolution with no operator dependence and no ionizing radiation is the imaging modality of choice for evaluation of hip joint abnormalities. MRI offers valuable information regarding occult bony and cartilage injury such as stress fractures, avascular necrosis, and osteoarthritis, as well as soft tissue abnormalities such as muscle tears and bursitis. MRI provides a useful assessment of patients in whom a femoro-acetabular impingement is clinically suspected. The present hospital based cross-sectional study was conducted to estimate the role of MRI in early evaluation of hip joint pathologies. The study was conducted in Department of Radio diagnosis from December 2016 to October 2018. A total sample size of 50 patients referred to the department of Radio diagnosis with clinical history of hip pain was included in the study. Patients with history of acute trauma, history of metallic implants insertion, cardiac pacemakers and metallic foreign body in situ and patient with congenital abnormality were excluded. In present study the MRI findings in avascular necrosis among patients showed that majority of patients showed focal subchondral signal abnormality (100%) followed by double line sign (75%) The other findings include marrow edema (43.75%) and joint effusion (37.5%). MRI findings in avascular necrosis among patients by Mitchelles classification showed that majority of patients had Stage C AVN (37.5%) followed by Stage B (25%) while by Ficat and Arlet classification majority of patients had Stage III AVN (43.75%) followed by Stage II (31.25%). Takatori Y *et al.*[5] reported that 85% of the patients of avascular necrosis show a characteristic "double line" sign on T2 weighted images which is a specific finding that consists of concentric low- and high signal intensity rims that surround the area of marrow signal intensity change within the femoral head. In study by Hayam Abd *et al.*,[8] the characteristic "double line" sign on T2 weighted images was seen in 80% of patients with AVN (20 patient) . In the study done by the Khaladkar Sanjay M *et al.*[9] double line sign on T2 weighted images was seen in 56.8% of patients of AVN. A double line sign seen in AVN as an outer low signal intensity rim and an inner high-intensity band on T2W images was seen in 75% of cases which is consistent with the previous studies by Mitchell *et al.* [11] and Mitchell *et al.* [10] found it in 80% and 71% of the cases, respectively. These data support the hypothesis that early non-traumatic osteonecrosis is associated with hyperemia and/or an increase in capillary permeability rather than acute devascularization and that diffuse marrow edema is the initial finding in early non-traumatic osteonecrosis. In a study done by Arvind kumar Vaghamashi *et al.*[12] on imaging findings depicted on MRI in patients with a painful hip joint most common MRI finding of AVN was focal subchondral signal abnormality which was present in 100 % of the lesions. Chaudhari NH *et al.* [13] assessed the role of MRI in early diagnosis of AVN and found that out of total 60 femoral heads (bilateral femoral heads of 30 patients) 51 were showing features of AVN, while 9 were normal. Out of 51 femoral heads showing AVN, 21 showed subchondral collapse. Bone marrow edema was seen in 34 femoral heads out of 51 femoral heads with AVN. Joint effusion was observed in 37 femoral heads out of 51 femoral heads with AVN. It our present study it was observed that majority of patients showed focal subchondral signal abnormality (100%) followed by double line sign (75%) The other findings includes marrow edema (43.75%) and joint effusion (37.5%). In the study done by Mitchell D *et al.*l [6] joint effusion is found is 58% of the total AVN patients. While in our study is found in 37.5% of the patients. The MRI findings in osteoarthritis among patients showed that majority of patients showed patients showed joint effusion (100%) followed by synovial thickening (71.42%) The other findings include marrow edema (71.42%), subchondral cysts (57.14%), joint space narrowing (57.14%), marginal osteophytes (57.14%) and soft tissue edema (42.86%). Hayashi[14] reviewed that bone marrow signal alteration (bone marrow edema) is a common magnetic resonance imaging feature of hip OA and the degree of bone marrow edema, as assessed by MRI, correlates with the severity of hip pain in cases with osteoarthritis. Tushar Kalekar *et al.*[14] assessed the role of MRI in early evaluation of painful hip joint observed that commonest MRI abnormality seen in cases of osteoarthritis was signal loss in the femoral head and neck on T1W images which was found in 90% cases. Boutry *et al.*[16] demonstrated joint effusion (100%), bone marrow edema (83%) and subchondral cysts (83%) in his study on hip osteoarthritis. Osteoarthritis (OA) is a disease-causing destruction of synovial joint. The risk for disability and dependency from changes of OA is comparable with that of cardiovascular disease in the elderly. MRI has some credible role as a non-invasive method of depicting early changes of OA when compared with standard radiograph, histology, and other techniques, however still Radiography continues to be used as a confirmatory imaging modality by clinicians due to its ready availability and cost effectiveness. The signs on MRI include joint effusion, reduced joint space, marrow edema, osteophytes, cartilage defects and subchondral cysts and fissures. In our study cartilage is affected in nearly 71.42% of the patients. This finding is well correlated with the study done by Teichtahl, A. J.[17] Iidaka T *et al.*[18] studied on Osteoarthritis/ osteoporosis against disability on the basis of radiographic evidence and found that males are more commonly affected than females while the severity of osteoarthritis is

more common in females. While in our study total 5 out of 8 patients of osteoarthritis were female. In the present study, the MRI findings in osteoporosis showed that majority of patients had marrow edema of femoral head and neck (100%) followed by joint effusion (75%) and marrow edema of the acetabulum (50%).

CONCLUSION

It was observed that MRI was very useful in the assessment of the severity and extent of the underlying lesion in various conditions of painful hip joint.

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