

MRI evaluation of nontraumatic hip joint pain

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Abstract

Imaging of the hip was among the earliest reported applications of musculoskeletal magnetic resonance (MR) imaging. MR imaging is a valuable tool in the evaluation of hip disorders because it enables assessment of articular structures, extra-articular soft tissues, and the osseous structures that can be affected by hip disease¹. The principal benefit of the true coronal and axial planes is that they provide symmetric, bilateral images, which can be important in the diagnosis and can greatly accelerate the time required to evaluate both hips. The femoral head and neck and the intertrochanteric region are best appreciated on coronal MR images. Axial MR images provide good visualization of the articular space, hip musculature, and supporting ligaments². The diagnostic role of MR imaging in the evaluation of AVN is evolving. MR imaging is becoming increasingly useful in the diagnosis and management of pediatric hip disorders. It is unique in its ability to depict cartilage and is, therefore, especially efficacious in the evaluation of the pediatric hip².

Key Words: Hip, Avascular necrosis, MRI, Pain.

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insertion cardiac pacemakers and metallic foreign body inside were excluded.

RESULTS AND OBSERVATIONS

Table 1:

| Gender | Number Of Patients | % |
|--------------|--------------------|-------------|
| Males | 28 | 73.7% |
| Females | 10 | 26.3% |
| Total | 38 | 100% |

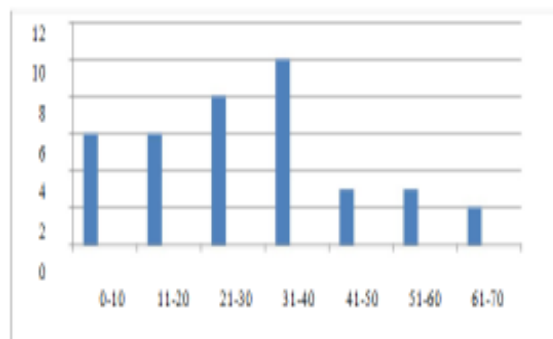


Figure 1:

Our study consisted of patients between the age groups of 0 – 70 years with a mean age of 35 years with male preponderance.

INTRODUCTION

Imaging of the hip was among the earliest reported applications of musculoskeletal magnetic resonance (MR) imaging. MR imaging is a valuable tool in the evaluation of hip disorders because it enables assessment of articular structures, extra-articular soft tissues.

MATERIALS AND METHODS

Prospective cross sectional study of patients presenting with acute or chronic non traumatic hip pain admitted at Gandhi medical college from October 2014 to October 2016. Here in we report 38 cases. Patients of all age groups were included. We subjected them for MRI study and diagnosed to have specific etiologies. Cases with history of Trauma, claustrophobia, metallic implants

DISCUSSION



Figure 2:

Here, 14cases had AVN of femoral head,4cases were having joint effusion,2 cases of perthes disease,1case of SCFE, 1 case of Femoroacetabular impingement, 1 case of Transient osteoporosis of bilateral hips,8 cases of inflammatory arthritis,1 case of synovial thickening with joint effusion(transient synovitis),1 case of septic arthritis, and 1 case of osteomyelitis.

AVASCULAR NECROSIS

Out of 14 cases, equal proportion of cases showed unilateral (7cases – 50%) and bilateral (7cases – 50%) involvement.

Table 2: AVN- unilateral grading

| Mitchell's Grade | Number Patients | % (N=7) |
|------------------|-----------------|---------|
| Class A | 3 | 42.8% |
| Class B | 0 | 0% |
| Class C | 3 | 42.8% |
| Class D | 1 | 14.3% |

Table 3: Avn-Bilateral Grading

| Mitchells Grade | Number of Patients (Rt) | % (N=7) | Number of Patients (Lt) | % (N=7) |
|-----------------|-------------------------|---------|-------------------------|---------|
| Class A | 1 | 14.3% | 1 | 14.3% |
| Class B | 4 | 57.1% | 4 | 57.3% |
| Class C | 1 | 14.3% | 2 | 28.5% |
| Class D | 1 | 14.3% | 0 | 0% |

Kim *et al*³ reported that trauma involving the proximal femur or acetabulum may lead to unilateral avascular necrosis, however, non-traumatic avascular necrosis is bilateral in 50-80% of patients. MR imaging is reported to have a sensitivity of 95% and specificity of 98% in the diagnosis of AVN of the hip. It detects the bone marrow edema associated with early AVN, which is seen as decreased signal intensity with poorly defined margins on T1-weighted images⁴. MRI is the imaging modality of choice, demonstrating diffuse low signal on T1 weighted

images and high signal on T2 fat suppressed or STIR images, indicating bone marrow edema, several weeks before radiographic changes are present⁵.

Table 4: Inflammatory arthritis

| MRI Findings | Number of Patients | Percentage % (N=8) |
|--------------------------------------|--------------------|--------------------|
| Synovial hyper intensity on T2W | 4 | 50% |
| Joint effusion | 8 | 100% |
| Bone marrow edema | 8 | 100% |
| Sub articular cysts | 2 | 25% |
| Joint space reduction | 7 | 87.5% |
| Joint destruction and bony ankylosis | 1 | 12.5% |
| Soft tissue hyperintensity on T2W | 2 | 25% |
| Sacroiliac joints involvement | 4 | 50% |
| Erosions | 8 | 100% |
| Fusion of sacroiliac joints | 2 | 25% |

Table 5: Perthes disease

| MRI Findings | Number of Patients | Percentage% (N=2) |
|----------------------------------|--------------------|-------------------|
| Epiphyseal hyperintensity on T2W | 2 | 100% |
| Bone marrow edema | 1 | 50% |
| Altered femoral head Contour | 2 | 100% |
| Joint space narrowing | 2 | 100% |
| Decreased epiphyseal Height | 2 | 100% |
| Joint effusion | 2 | 100% |
| Subchondral fracture | 1 | 50% |
| Epiphyseal fragmentation | 1 | 50% |

In our study, 2 patients of Legg-Calvé-Perthes disease had unilateral involvement. Both cases were associated with altered femoral head contour, joint space narrowing, joint effusion and decreased epiphyseal height. In the single patient, Bone marrow edema in the form of T2/STIR hyperintensity and subchondral fracture was identified. In another patient epiphyseal fragmentation and metaphyseal cystic area in the form of T2 hyperintensity with sclerosis was identified. Toby EB *et al*⁶ studied the efficacy of magnetic resonance imaging (MRI) in the assessment of pediatric hip disease by scanning the hips of 24 children. Twelve patients with Legg-Calvé-Perthes disease showed characteristic areas of low-intensity signal representative of necrotic areas of the capital epiphysis. Most cases of LCP disease are unilateral, approximately 15% of individuals are affected bilaterally. When bilateral, the femoral heads are most commonly asynchronously affected. LCP disease is

generally considered to be idiopathic without an identifiable inciting factor⁷.

Table 6: Transient synovitis

| MRI Findings | Number of Patients | Percentage % |
|---------------------|--------------------|--------------|
| Joint effusion | 1 | 100% |
| Synovial thickening | 1 | 100% |

In our study 1 pediatric patient had presumed diagnosis of transient synovitis and the dominant MRI finding was joint effusion, associated synovial thickening. Transient osteoporosis of the hip is an uncommon, usually self-limited, distinct clinical entity of unknown etiology. Curtiss and Kincaid described the first 3 cases in 1959, all of which involved pregnant women in their third trimester who presented with thigh pain exacerbated by weight-bearing with radiographic evidence of femoral head osteopenia in the absence of any systemic, metabolic disturbance⁸. The condition was named transient osteoporosis of the hip by Hunder and Kelly in 1967⁹. Two-thirds of the cases are reported in healthy middle-aged men between the ages of 40 to 60 years, One-third of the cases occur frequently in women who are in the third trimester of pregnancy or in the early postpartum period. Children are rarely affected^{10,11}. Although the hip is most commonly affected; transient osteoporosis can affect the knee, foot, ankle and less frequently shoulder, lumbar spine, elbow and the wrist. The left hip is involved more commonly than the right. MRI shows abnormal findings before conventional radiography, as early as 48 hours after the onset of TOH¹². Yang *et al*¹³ reported that the main diagnostic MRI findings seen in transient synovitis are joint effusion, presence of synovial thickening, alterations in signal intensity of soft tissue and bone marrow in the affected hip joint.

Table 7: Slipped capital femoral epiphysis

| MRI Findings | Number Of Patients | Percentage % |
|-------------------------|--------------------|--------------|
| Bone marrow edema | 1 | 100% |
| Epiphyseal displacement | 1 | 100% |

We had single case of SCFE having MRI findings of fracture along the growth plate in the femoral head with posterior inferior displacement of epiphysis and bone marrow edema (STIR hyper intensity) along femoral head and neck. Dillon reported that MRI provides an early and sensitive method for detecting the pre-slip stage of the proximal femoral epiphysis and the earliest evidence of slipped capital femoral epiphysis on MRI is diffuse or globular epiphyseal widening and a hyperintense signal of

the bone marrow along the epiphysis on T2-weighted images which indicate stress and edema.

CONCLUSION

MRI is the method of choice in early characterization of various disorders of hip, assessing the full extent of osseous, chondral and soft tissue involvement and assisting the clinician in management decisions. MR imaging can also accurately demonstrate joint effusions, synovial proliferations, articular cartilage abnormalities, subchondral bone, ligaments, muscles, and juxta-articular soft tissues. Finally, we conclude that MRI of the hip joint is an informative, diagnostic, noninvasive, rapid and accurate imaging modality for the assessment of hip pain and appropriate imaging modality for delineation of different hip joint pathologies.

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