

MRI Evaluation of Nontraumatic Hip Joint Pain

Dr. Deepthi Kondeti¹, Dr. Swapna Gangishetty²

¹Resident, Department of Radio Diagnosis, Gandhi Medical College, Secunderabad

²Resident, Department of Radio Diagnosis, Gandhi Medical College, Secunderabad

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 disease⁽¹⁾. 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 ligaments⁽²⁾. 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 hip⁽²⁾.*

Keywords: Hip, Avascular necrosis, MRI, Pain

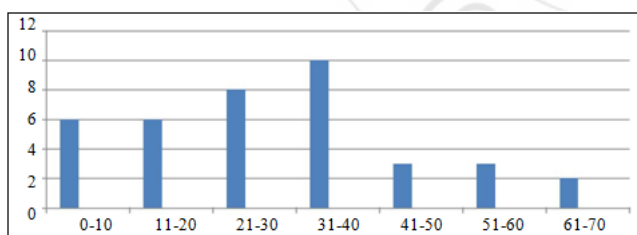
1. Materials and Methods

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 insertion cardiac pacemakers and metallic foreign body insitu were excluded.

2. Observations and Results

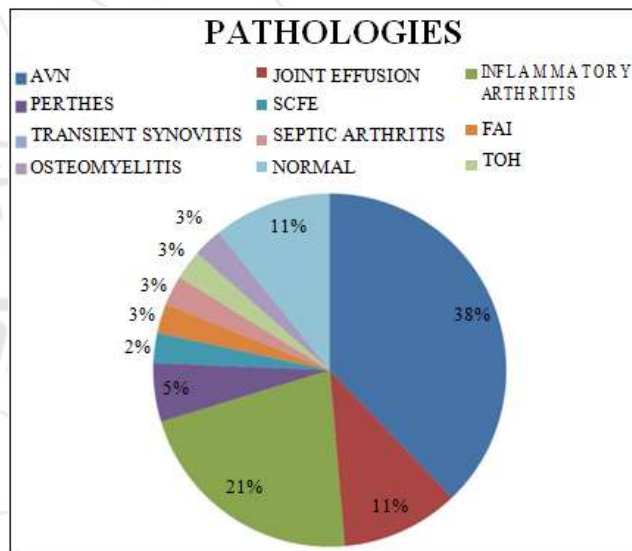
Gender	Number of Patients	%
Males	28	73.70%
Females	10	26.30%
Total	38	100%



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

3. Discussion

Pathologies



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.

AVN- Unilateral Grading

Mitchell's Grade	Number of Patients	%(N=7)
Class A	3	42.80%
Class B	0	0%
Class C	3	42.80%
Class D	1	14.30%

AVN-Bilateral Grading

Mitchells Grade	Number of Patients(RT)	%(N=7)	Number of Patients(LT)	%(N=7)
Class A	1	14.30%	1	14.30%
Class B	4	57.10%	4	57.30%
Class C	1	14.30%	2	28.50%
Class D	1	14.30%	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 images⁽⁴⁾. 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 present⁽⁵⁾.

Inflammatory Arthritis

MRI Findings	Number of Patients	Percentage %
	Patients	(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	87.50%
Joint destruction & bony ankylosis		
Soft tissue hyperintensity on T2W	2	25%
Sacroiliac joints involvement	4	50%
Erosions	8	100%
Fusion of sacroiliac joints	2	25%

Perthes Disease

MRI Findings	Number of Patients	Percentage %
	Patients	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 factor⁽⁷⁾.

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 disturbance⁽⁸⁾. The condition was named transient osteoporosis of the hip by Hunder and Kelly in 1967⁽⁹⁾. 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 TOH⁽¹²⁾. 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.

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.

4. 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.

References

- [1] Manaster BJ. Adult Chronic Hip Pain: Radiographic Evaluation.
- [2] Radio Graphics 2000; 20: S3-S25.
- [3] Gabriel H, Fitzgerald SW, Myers MT, Donaldson JS, Andrew K. Poznanski. MR Imaging of Hip Disorders. Radio Graphics 1994; 14:763-
- [4] Kim YM, Kim HJ. The pattern of bone marrow edema on MRI in osteonecrosis of the femoral head. J Bone Joint Surg Br 2007; 82:837-1.
- [5] Takatori Y, Kokubo T, Ninomiya S. Avascular necrosis of the femoral head. JBJS 2000; 75: 217-1.
- [6] Vande BC, Malghem JJ, Lecouvet FE. Idiopathic bone marrow edema lesions of the femoral head: predictive value of MR imaging findings. Radiology 2003; 212:527-5.
- [7] Toby EB, Koman LA, Bechtold RE. Magnetic resonance imaging of pediatric hip disease. J Pediatr Orthop. 1985 Nov-Dec; 5(6): 665-71.
- [8] Yang WJ, Lim GY. MR imaging of transient synovitis: differentiation from septic arthritis. Pediatr Radio 2009; 139:532-7.
- [9] Curtiss PH Jr, Kinacid WE. Transitory demineralization of the hip in pregnancy. A report of three cases. J Bone Joint Surg Am 1959;41A:1327-33.
- [10] Hunder GG, Kelly PJ. Roentgenologic transient osteoporosis of the hip. Ann Intern Med 1968;69:633.
- [11] Bijl M, van Leeuwen MA, van Rijswijk MH. Transient osteoporosis of the hip: presentation of (a)typical cases and a review of the literature. Clin Exp Rheumatol 1999;17:601-4.
- [12] Schapira D. Transient osteoporosis of the hip. Semin Arthritis Rheum 1992;22:98-105.
- [13] Arayssi TK, Tawbi HA, Usta IM, Hourani MH. Calcitonin in the treatment of transient osteoporosis of the hip. Semin Arthritis Rheum 2003;32:388-97.
- [14] Yang WJ, Lim GY. MR imaging of transient synovitis: differentiation from septic arthritis. Pediatr Radio 2009; 139:532-7