



Radiodiagnosis

MAGNETIC RESONANCE IMAGING IN EVALUATION OF LOW BACKACHE OF NON-TRAUMATIC SPINAL ETIOLOGY

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ABSTRACT Low backache is a commonly encountered complaint in clinical practice with a significant economic burden to the society. Currently MRI provides most precise visualisation of all spinal elements and paraspinal soft tissues. The ability of MRI to detect disc and subchondral bone marrow signal changes makes it an investigation of choice for evaluation of Low backache.

MATERIALS AND METHODS: This descriptive observational study was carried out over a period of 12 months from June 2018 to May 2019 in 100 patients with low backache who underwent MRI of the lower spine at Department of Radio-Diagnosis, SRMC & GH, Nandyal. Patients who met the inclusion / exclusion criteria were included in the study.

RESULTS: The study included a total of 100 patients. More than 40% of patients were in the age group of 41 to 60 years. There were 25 patients in the age group of 21 to 40 years, followed by age group of > 60 years and least patients were in the age group of < 20 years.

KEYWORDS : Low backache, MRI, Non-Traumatic causes

INTRODUCTION

Low backache is a commonly encountered complaint in clinical practice with a significant economic burden to the society. In India, a high incidence of Low backache has been found in individuals who are involved in jobs that require handling heavy loads, constant sitting/standing position or working at improper body position and prolonged working hours.

Currently MRI provides most precise visualisation of all spinal elements and paraspinal soft tissues. The ability of MRI to detect disc and subchondral bone marrow signal changes makes it an investigation of choice for evaluation of Low backache.

AIMS AND OBJECTIVES

The aims and objectives of this study were:

- To evaluate the changes seen on MRI in patients with low backache due to various non-traumatic spinal causes
- To distinguish various causes of low backache with level of spinal involvement.
- To evaluate the concordance between clinical diagnosis and MR imaging.

MATERIALS AND METHODS

This descriptive observational study was carried out over a period of 12 months from June 2018 to May 2019 in 100 patients with low back pain who underwent MRI of the lower spine at Department of Radio-Diagnosis, Santhiram Medical College & General Hospital, Nandyal. Patients who met the inclusion / exclusion criteria were included in the study.

Inclusion Criteria:

- Patients with low-back ache of non-traumatic spinal etiology who underwent MRI of lower spine and had positive findings on MRI.

Exclusion Criteria:

- Patients with previous history of spinal surgery.

Method of collection of data:

The study was conducted in patients who underwent MRI for evaluation of low backache and agreed to participate in the study. An informed consent was taken from the patient before including them in the study.

The following sequences of the lower spine were performed:

- T2 weighted imaging (T2 WI) sagittal spine,
- T1 weighted imaging (T1 WI) sagittal spine,
- T1 WI axial images of relevant segments of spine,
- T2 WI axial images of relevant segments of spine,
- Coronal short τ wave inversion recovery (STIR) sequence of region of interest,

- T1 fat saturation (FS) sagittal spine
- T1 FS axial images of relevant segments of spine
- Slice Thickness of 4mm, Spacing - 1mm, Flip angle - 150°.

Contrast MR study (I.V gadolinium injection) was performed wherever required. Patient's renal function was assessed in the form of blood urea and serum creatinine results and only patients with a normal renal function underwent contrast study (whenever indicated).

SIEMENS MAGNETOM ESSENZA, syngo version - syngo VH21ASL36P43 machine TIM+DOT System, a 1.5 T MRI scanner used in the study

RESULTS

Table No.1 : MRI Diagnosis of Various Causes of Low Back Pain

MRI Diagnosis	No of patients	%
Degenerative Changes	87	82.08
Infective	20	18.87
Inflammatory	4	3.77
Neoplastic	11	10.38
Congenital	4	3.77
Arachnoid cyst	2	1.89

Figure No.1 : (A) Sagittal and (B) axial T2 weighted MRI of L5 spine showing central disc protrusion with caudal extension causing spinal canal stenosis (black arrow).

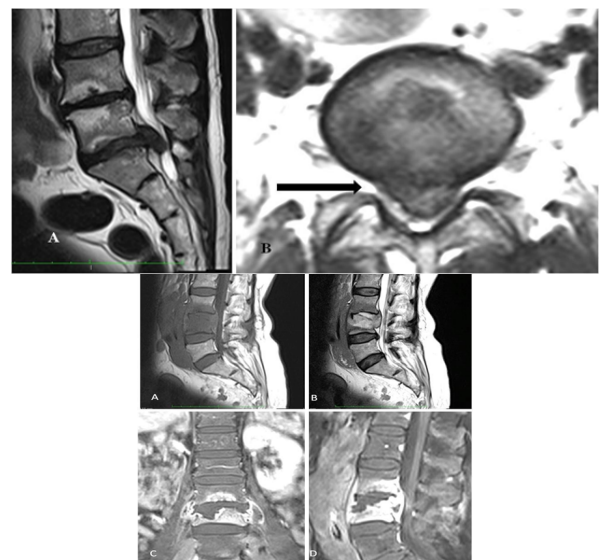


Figure No.2 : A case of tubercular spondylodiscitis. Sagittal (A) T1 and (B) T2 weighted MRI showing altered marrow signal involving L4 and L3 vertebral bodies causing spinal canal stenosis. (C) Coronal and (D) sagittal T1-weighted fat saturated MRI showing heterogeneously enhancing L3 and L4 vertebral bodies with loculated collections in pre and paravertebral regions at L3-L4 level, extending to epidural space with central non-enhancing necrotic areas– suggestive of Pott's spine

DISCUSSION

The study included a total of 100 patients. More than 40% of patients were in the age group of 41 to 60 years. There were 25 patients in the age group of 21 to 40 years, followed by age group of > 60 years and least patients were in the age group of <20 years.

Nearly half of the patients in our study had bilateral radiculopathy, radiculopathy on right side and lastly left sided radiculopathy. All the patients with radiculopathy had nerve root impingement/ compression on MRI.

Degenerative changes were seen in more than 80% of patients, followed by infective (18.87%) and neoplastic (10.38%) etiologies. Degenerative changes were considered primary cause for low back pain in 65 patients.

Degenerative Changes

Degenerative changes were observed in 87 patients in our study. Among degenerative changes, degenerative disc changes were the most common abnormality seen in > 70% of patients (71.7%) followed by endplate changes (59.4%), vertebral changes (54.7%) joint and ligament changes (41.5%).

Among disc changes, disc bulges were most commonly seen followed by disc protrusion, annular fissure/tears, disc extrusion and disc sequestration. The most commonly affected discs were L4-5 followed by L5-S1 and L3-4. L1-2 and L2-3 were least commonly affected discs.

Degenerative Vertebral End Plate Changes

In our study vertebral end plate changes were seen in the form of Schmorl's nodes in 48 patients and Modic endplate changes seen in 51 patients³. Type II Modic end plate changes were commonest and seen in 37 patients followed by type I and type III Modic end plate changes.

Degenerative Vertebral Changes

In our study, vertebral changes were seen in the form of spondylolysis, spondylolisthesis and osteophytes. Most of the cases of spondylolisthesis¹ were common in patients > 40 years or older (19 of 23 patients; 82.6%).

Degenerative facet and ligament changes

In our study degenerative joint and ligament changes were seen in the form of ligamentum flavum hypertrophy (LFH) and facet arthropathy (FA). LFH and FA were almost always associated with degenerative changes (41 of 43 patients; 95.34%).

Lumbar canal stenosis

Lumbar spinal canal stenosis (defined as <10 mm of AP diameter) was seen in 60 patients in the present study². Degenerative changes were the commonest cause of lumbar canal stenosis (71.7%) followed by infections (13.3%), tumours⁷, arachnoid cyst (3.3%) and congenital lumbar spinal canal stenosis (1.7%).

Infections of Spine

Infective causes of low backache were seen in 20 patients in our study and included tubercular spondylitis and pyogenic spondylitis. Tubercular spondylitis⁴ was the commonest infective condition seen in 17 patients (85%) followed by pyogenic spondylitis (15%). In all these cases, final diagnosis was confirmed by demonstrating acid fast bacilli on Ziehl Neelson staining for tubercular spondylitis and culture/sensitivity for pyogenic spondylitis.

Pott's spine was seen mostly in patients aged 40 years or older (11 of 16; 68.75%) (range 20 to 75 years) without any gender predilection⁵.

There were three cases of pyogenic spondylitis in our study. Among pyogenic spondylitis, *S. aureus* was reported in two cases and *E. coli* in one case. All the cases with tubercular spondylitis were treated with antitubercular treatment and pyogenic spondylitis were treated with appropriate antibiotics.

Sacroiliitis

In our study there were four cases of sacroiliitis. Three cases were bilateral and one case was unilateral (left side). MRI showed a high positive predictive value in the diagnosis of sacroiliitis in our study. Changes of sacroiliitis are seen earliest on MRI. Bone marrow edema along the sacroiliac joints was the most common feature and was seen in three patients.

Neoplasms

There were 11 neoplasms noted in our study, 10 were malignant and one tumour was benign. Among the malignant conditions, most of them were metastasis, seen in eight patients (age ranging from 41 to 65 years). The primary lesions were carcinoma prostate in four patients, carcinoma lung in three patients and carcinoma esophagus in one patient⁶. There was one each case of multiple myeloma and sacral chordoma. There was a case of benign giant cell tumour.

Chordomas are most commonly seen in the sacrococcygeal region (> 50 to 60%)⁸. Presence of concurrent paresthesias, bladder/bowel disturbance should direct the clinician to suspect sacrococcygeal chordoma. Multiple myeloma is a commonly encountered primary malignancy of bone and constitutes for approximately 10% of all hematologic malignancies. Giant cell tumours (GCT) involving the spine are rare and comprise <3% of all GCT.

Congenital lesions

There were two cases of myelomeningocele, one case each of diastematomyelia and arteriovenous malformation (AVM) of spinal cord in our study. There were two cases of arachnoid cysts seen in patients aged 49 and 55 years, both of which caused mass effect in the form of compression of cauda equina fibres.

All these cases underwent surgery and final diagnosis was confirmed. Other findings seen in our study were LSTV-L, LSTV-S, Tarlov cyst (perineural cyst) and kyphosis/scoliosis, all of which were seen in patients who had primary MRI diagnoses and were not considered as the primary pathology responsible for low back pain.

CONCLUSION

In this study of 100 patients, degenerative changes were the commonest cause for low backache followed by infective and neoplastic etiologies. L4-L5 disc was the most commonly involved spinal level in our study followed by L5-S1 and L3-L4. MRI provides most precise visualization of all spinal elements and paraspinal soft tissues. Additionally, the ability of MRI to detect disc and vertebral signal changes has made it an investigation of choice for evaluation of low backache.

Pott's spine was the commonest infection followed by pyogenic spondylitis. MRI helped in narrowing down differential diagnosis and helped in arriving to more accurate diagnosis.

MRI is the modality of choice for evaluation of spinal cord neoplasms as it can provide diagnosis or differential diagnosis in majority of cases as clinical findings are often insufficient to arrive at working diagnosis.

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