

## A Study on Role of Magnetic Resonance Imaging (MRI) In Evaluation of Low Backache

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**Abstract:** Low backache (LBA) is one of the commonest presenting complaints of patients and it is important to evaluate it. Since degenerative changes and neoplastic lesion present initially with (LBA, it is important to differentiate the lesions as degenerative, benign or malignant. Once the lesion is differentiated the patient can be managed appropriately. Considering these facts in mind, the present study was planned to evaluate the role of MRI in lower backache. A hospital based observational study which was cross-sectional in nature was carried out for a period of 12 months among adult patients those attended the MRI Centre of the Midnapore Medical College and Hospital, West Bengal for MRI evaluation for their lower backache. This study revealed various pathological conditions responsible for LBA. Degenerative disc lesion was found the commonest cause of LBA and postero-lateral herniation at the level of L4-L5 was found the commonest site. To conclude, MRI is an important tool in diagnosing the pathological lesions responsible for LBA and in guiding the clinician in further management of the patient.

**Keywords:** Low backache, MRI, Radiculopathy

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### I. Introduction

LBA is one of the commonest complaints in patients.<sup>[1]</sup> It is important to evaluate the cause of the low backache and rule out the causes. In the present scenario MRI plays an important role in evaluation of LBA to identify the pathology.<sup>[2]</sup> MRI has good soft tissue resolution, disc material can be well visualized, any bony pathology can be identified and pathology in the spinal canal can be found and evaluated. Various sequences are used in MRI study. If any lesion is identified it can be further evaluated with contrast material based on the features in plain MRI.<sup>[3]</sup>

Acute LBA is a common presenting symptom in primary health care. Two thirds of the adult population suffers from LBA at some point of time in their lives.<sup>[4]</sup> The prevalence of low back pain is as high as 70- 85%.<sup>[5]</sup> It is often self limiting in majority of the patients. The etiology cannot be ascertained in 95% of the patients, where the patient may have suffered a muscular or ligamentous injury.<sup>[6, 7]</sup> Extensive work up is warranted in cases where there is an association of acute backache with neurological symptoms to look for spinal stenosis, herniated intervertebral disc or cauda equina syndrome which accounts of a minority of the cases (5%). LBA can be categorized as: (i) non specific low back pain, (ii) LBA associated with radiculopathy, (iii) LBA with specific spinal cause which includes patients with neurological deficits or with serious underlying conditions like infections, tumours and patients not responding to therapy as in cases of ankylosing spondylosis or vertebral compression fractures [8]. Considering those facts in mind, the present study was planned with an aim to evaluate the role of MRI in backache.

### II. Material And Methods

**Study Design and Study Setting:** An institution based, observational, analytic study was conducted which was cross-sectional nature among the adult patients those attended the MRI Centre, namely; 'AMRI MRI Centre' of the Midnapore Medical College and Hospital, West Bengal for MRI evaluation for their lower backache.

**Study Period:** The study was conducted from March 2017 to February 2018 (for a period of 12 months).

**Study Participants:** All the adult patients aged 30 to 70 years those were referred to the MRI centre of the Midnapore Medical College and Hospital, Midnapore, Paschim Medinipur for MRI evaluation for their low backaches and those were willing to take participated voluntarily were included as the study participants in the present study. The following exclusion criteria were used for the selection of the study participants.

**Exclusion criteria:** The following criteria were used in the present study.

- Patients having claustrophobia.
- Patients with cardiac pacemaker.
- Cochlear implant.
- Patients with history of trauma and surgery.

**Sample size and Sampling Technique:** The present study included all the adult patients aged 30 to 70 years patients and were voluntarily willing to take participated in the present study were included. During the data collection period, a total 109 patients were attended to the MRI centre for evaluation of their low backache. A total 9 patients were excluded from the study due to either history of trauma or past history of surgery.

**Ethical Issues:** The study was approved by the ‘Institutional Ethics Committee’ of the Midnapore Medical College, Paschim Medinipur, West Bengal, India. Informed written consent was obtained from each of the study participants after explained the purpose and expected outcome of the study.

**Methods of Data Collection:** A pre-tested and pre-designed questionnaire was used for data collection. Basic socio-demographic information were collected. Adult patients those attended to the ‘AMRI MRI centre’ of the Midnapore Medical College, Paschim Medinipur for evaluation of their low backache were undergone MRI by the using the GE, 1.5 Tesla MRI machine. Imaging in various sequences was performed in supine position by using standard technique. The sequences used in our setting are T1 W.I, T2 W.I, STIR,GRE and T1 FS CONTRAST. For better diagnosis contrast (Magnavist, Bayer, Germany) was used wherever necessary. Images were acquired in axial, coronal and sagittal planes. Slice thickness of 5 mm was considered.

**Data Entry and Analysis:** After verification, data were entered and analyzed by using the SPSS 21.0 software package (statistical package for social sciences). The categorical variables were expressed in terms of numbers and percentages. Results were expressed by means of either tables or figures.

### III. Result

A total of 100 patients were studied for the evaluation of LBA, out of which 50% were male and remaining 50% were female. The mean age of the study participants was 58.6± 12.8 years. In this study 50% were males and 50% were females. Based on the aetiology the lesions were categorized as degenerative disc disease, infective, congenital, vertebral neoplastic,spinal tumour, sacrolitis, different pelvic diseases and non traumatic spondylolisthesis, Degenerative disc diseases comprised of annular disc bulge and disc herniation which comprised maximum percentage (70%) in the study population. Congenital causes of LBA were sacralisation, lumbarisation and fusion vertebrae. Two patients (2%) had low backache due to congenital cause. In the congenital causes, maximum cases had sacralisation. The other causes included non-traumatic spondylolisthiasis (8%), infective mostly tuberculosis (5%), haemangioma (3%), sacroilitis (3%) and others such as endometriosis, tarlov cyst, spinal tumour, pelvic inflammatory diseases etc. Another important cause of LBA was found neoplasia (4%) out of which 2 (50%) had found metastatic lesions. [Table-1].

**Table 1:** Distribution of the study participants by different cause of the Low backache (n=100)

Different causes of LBA	Numbers	Percentages (%)
Degenerative	70	70
Infective	5	5
Congenital	2	2
Vertebral Epiphysitis	1	1
Neoplastic	4	4
Sacroilitis	3	3
Hemangioma	3	3
Endometriosis	1	1
Pelvic Inflammatory Disease	1	1
Tarlov Cyst	1	1
Spinal Tumour	1	1
Non-traumatic spondylolisthiasis	8	8
Total	100	100

Total 335 disc herniations especially in degenerative disc diseases were found in different spinal locations among 100 patients. Maximum number of the disc herniation was found in postero-lateral position (total 200 sites; 59.7%) which included both right paracentral and left paracentral. Central (total 80 sites; 23.9%) and foraminal (total 55 sites; 16.4%) disc herniation were also found. [Table-2].

**Table 2:** Distribution of the total disc herniation based on the position (n=335)

Position of the herniated disc*	Numbers	Percentages (%)
Postero-lateral	200	59.7
Central	80	23.9
Foraminal	55	16.4
Total	335	100

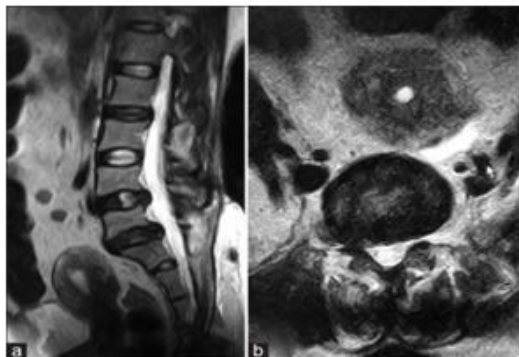
\* Multiple site disc herniation may present.

The types of herniation and the intervertebral levels at which these disc bulges were identified. Herniation was mostly seen in L4-L5 intervertebral disc level and the most common type of disc herniation was annular disc bulge. Other conditions seen in the study were disc protrusion, disc extrusion and disc sequestration. Least detected type of herniation in the study was disc sequestration. The different types of disc herniation along with lesions in different vertebral levels were shown in Table-3. The different MRI findings of the present study were documented in Figure-1 and Figure-2.

**Table 3:** Distribution of different types of disc herniation by levels of vertebral involvements (n=335)

Types of disc herniation \ Vertebral levels	L1-L2	L2-L3	L3-L4	L4-L5	L5-S1	Total
Annular Disc Bulge	07	12	48	91	41	199
Disc Protrusion	04	03	30	44	19	100
Disc Extrusion	00	02	04	12	06	24
Disc Sequestration	00	01	04	07	00	12
Total	11	18	86	154	66	335

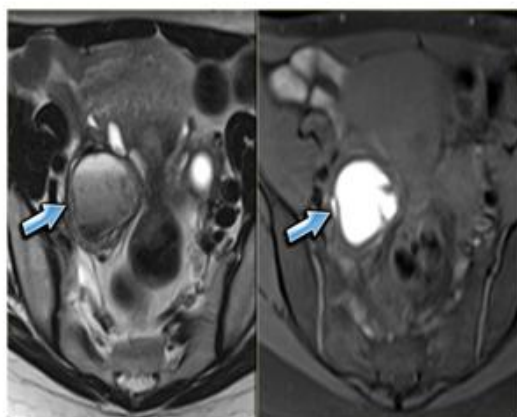
**FIG 1:** Few MRI findings of the present study.



Sagittal (a) & Axial (b) MRI shows mild disc degeneration and Rt. posterolateral disc protrusion at L4-L5 & L5-S1 level



Vertebral Epiphysitis



Endometriotic Cyst



Vertebral Hemangioma



Tarlov Cyst



Vertebral Fusion



Disc Bulge



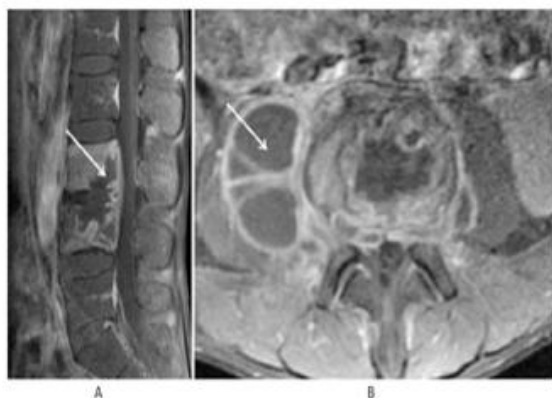
Sacralization



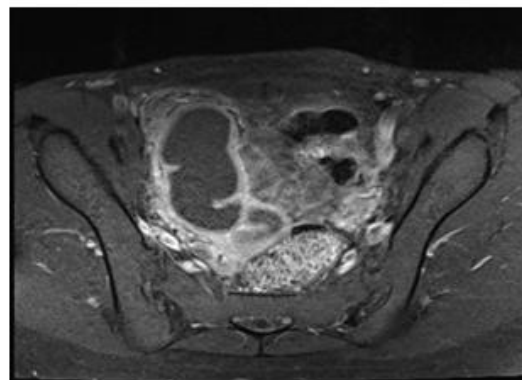
Metastatic lesion



Disc Protrusion



Tuberculous Spondylitis



Pelvic Inflammatory Disease

#### IV. Discussion

Most common cause of LBA is degenerative disc disease. Other causes of LBA were infective, traumatic, congenital and neoplastic. Degenerative disc disease can be classified as disc bulge or herniation. When the disc material is displaced beyond the edges of the apophysis then it is called disc herniation. Disc herniation can be sub classified as disc protrusion, extrusion and sequestration based on the shape of the material which is herniated. When the distance between the edges of the disc herniation is less than the distance between edges of the base it is called disc protrusion. Migration is the displacement of disc material from the site of extrusion. Migrated disc when it losses continuity with the parent disc is called sequestration. Munter M *et al.* described annular tear as focal area of T2 hyperintensity which is in annulus fibrosis posteriorly and separate from nucleus pulposus. . Jung HS *et al.*, in his study evaluated lumbar spine by MRI to discriminate between metastatic and



osteoporotic collapse of vertebra. <sup>[9]</sup> Abnormal signal intensity in posterior elements or in the pedicle, paraspinal mass, epidural mass or convex post border of vertebral body are the imaging features of metastatic compression fracture on magnetic resonance imaging. <sup>[9-14]</sup> Vertebral end plates and intervertebral discs can be visualized on sagittal and axial T1 and T2 weighted images. On T2WI there is good contrast between the inner, outer parts of annulus, the latter being more fibrous (low signal) and nucleus pulposus in which there is a higher water content (high signal intensity). In a study conducted by Flynn WT *et al.* the prevalence rate of compression fracture secondary to cancer was 4%, metastasis was seen in 9% of the patients. <sup>[10]</sup> Battie MC *et al.* in his study found that 76% of cause for low back ache was degenerative disc disease. <sup>[11]</sup> Similarly, in our study also we identified that 70% of cause for LBA was degenerative disc disease. <sup>[15-17]</sup> Knop-Jerges BM *et al.* in his study stated that most common position of disc herniation was posterolateral, which was about 60%. <sup>[18]</sup> Similarly, in our study also 59.7% patients had disc herniation in posterolateral position.

## V. Conclusion

MRI is very useful imaging modality in detecting the causes of low backache to aid in the appropriate treatment. By using MRI neoplastic lesions are diagnosed and the extent and involvement of the adjacent structures can be evaluated. The operability of the lesion can be assessed.

## VI. Study Limitations

Not all patients having pars defect with antero-listhesis gave confident history about absence of traumatic history. Some of the study participants were also unwilling for contrast study.

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