

3-TESLA MAGNETIC RESONANCE IMAGING FINDINGS IN PATIENTS WITH LOW BACKACHE

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Abstract

Introduction: Low backache is commonly experienced via adults during their lives. Though it is caused by degenerative changes, spinal stenosis, neoplasm, infection and trauma, lumbar disc degeneration is most commonly diagnosed abnormality associated. As Magnetic Resonance Imaging (MRI) is non-invasive imaging technique with excellent spatial and contrast resolution, it has become the investigation of choice in assessment of patients with low back pain. This study was designed to determine the styles of degenerative disc disease on MRI in patients with low backache.

Methods: A retrospective hospital-based study was performed at Department of Radiodiagnosis of DR.B.V.P. Rural Medical College, PIMS (DU), Loni, Maharashtra, India, by reviewing MRI reports of 210 patients who underwent MRI of lumbar spine for complaint of chronic low back pain, radicular pain, neurogenic claudication or various other signs and symptoms suggestive of lumbar degenerative disc disease from 6 months. The patients having MRI findings of acute spinal infection, recent trauma, tumors, spinal dysraphism and metabolic conditions were excluded from the study.

Results: Out of the 210 patients included in the study, 120 patients (60%) were male and 90 patients (40%) were female. The mean age of the study population was 45.29 ± 18.89 (14-85) years. Multiple contiguous level disc disease turned into the most common type of involvement which was noted in 105 (52%) patients. Grade 4 lumbar disc degeneration (graded as per category given by Pfirrmann et al) was noted in 63.3% (135) cases followed by Grade 2 in 28.2% (55) cases and Grade 1 in 5% (10) cases. The maximum common involvement was observed at L4-L5 level (80%) and L5-S1 levels (56.8%) followed by L3-L4 (33.9%) in decreasing order of frequency. The most common class was disc bulge noted in 49.5% (95) of cases. Nerve root compression was observed in 58% (115) of the total cases. Nerve root compromise was also noted most frequently compressing L5 nerve (29.32% of cases). Annular tear was observed in 16.20% (30) of cases and among them 20% (5) of cases had torn at intervertebral discs. It is most frequently noted involving L4-L5 intervertebral disc (75.5% of cases), followed by L5-S1 (24.5% of cases).

Conclusion: Disc degeneration is most common at L4-L5 level with more than one contiguous involvement of grade 4. Annular tear even though not common can occur and is also common at L4-L5 level.

Keywords: Annular tear; disc degeneration; low back ache; modic changes

Introduction

Low back pain is one of the common indications for MRI in our clinical practice. It is predicted that 70-80% of adults experience low backache at some time during their lives.¹ The causes of low lower back pain include degenerative changes, spinal stenosis, neoplasm, infection, trauma, and inflammatory or arthritic processes. Among those, lumbar disc degeneration is the most commonly diagnosed abnormalities related to lower back pain.² There are variety of factors that contribute to this condition. Aging, axial loading of disc, vascular growth and abnormalities in collagen and proteoglycan all contribute to disc degeneration. Disc herniation with radiculopathy and chronic discogenic lower back pain are the result of this degenerative process.³ MRI is non-invasive imaging method with great spatial and contrast resolution. For this reason, it has become the investigation of choice in evaluation of patients with lower back pain or radicular pain. It has also emerged as an investigation of choice over the other investigations for a herniated disc and end up a gold popular to diagnose herniated disc.⁴ MRI is also useful in making plans for surgical management of patients with sciatica as a result of lumbar disc herniation.⁵ As a result, MRI is the emerging radiological diagnostic tool in the management of low back pain. But MRI facility is not available in all parts of the country or even in the places where this investigation is available, being one of the costly investigations, it is probably beyond affordability for most of the population. Till date, now not many research has been done in our geographical region to identify spectrum of lumbar disc pathology. Hence, this study changed into designed to determine retrospectively the patterns degenerative disc disease on MRI in patients with low back pain. The result of the examination might have medical relevance about what is to be expected in the patient with low back pain due to degenerative changes

Materials and Methodology

This is a hospital based totally retrospective study of 210 patients with MRI reports of lumbar spine, performed at Department of Radiodiagnosis of Dr. B.V.P. Rural Medical College PIMS(DU), Loni, Maharashtra, India. Patients who underwent MRI lumbar spine for complaints of chronic low back pain, radicular pain, neurogenic claudication or various other symptoms and signs suggestive of lumbar degenerative disc disease from 6 months have been included in the examination. The patients having MRI findings of acute spinal infection, latest trauma, tumors, spinal dysraphism and metabolic conditions were excluded from the study. The MRI examination was performed on PHILIPS INGENIA 3.0T CX with acquisition of the T1W, T2W, STIR images in sagittal, axial and coronal planes. The following criteria were evaluated on MRI: lumbar disk degeneration (graded as according to classification given by Pfirrmann et al), disc herniation (graded as normal, bulge, protrusion, extrusion and sequestration), presence of annular tear, nerve root compromise (graded as per Pfirrmann et al classification), degenerative vertebral endplate changes (graded as per Modic

classification).^{6, 7, 8} All the MRI reporting was done by means of the principal investigator. Permission for the retrospective assessment was taken from the ethical committee.

Result: Out of the 210 patients, 120 patients (60%) had been male and 90 patients (40%) were female. The mean age of the study population become 45.29 ± 18.89 (14-85) years, 14.8% (40) have been less than 39 years, 39.4% (80) were in 40-59 years age group and 45.8% (90) older than 60 years.

Multiple contiguous level disc disease was noted in 105 (52%) patients, multiple level disc disease with skipped segments was noted in 21(12.5%) patients, while 84 (35.5%) patients in the study group had single level disc involvement. Grade 4 lumbar disc degeneration (graded as per classification given by Pfirrmann et al) was noted in 63.3% (135) cases followed by Grade 2 in 28.2% (55) cases and Grade 1 in 5% (10) cases.

The incidence of various categories of disc herniation at different levels was calculated and presented in the figure 1. The most not unusual involvement was observed at L4-L5 level (79.8%) and L5-S1 levels (58.9%) followed by L3-L4 (32.6%) in decreasing order of frequency. The most common category was disc bulge note in 49.5% (94) of cases involving L4-L5 disc.

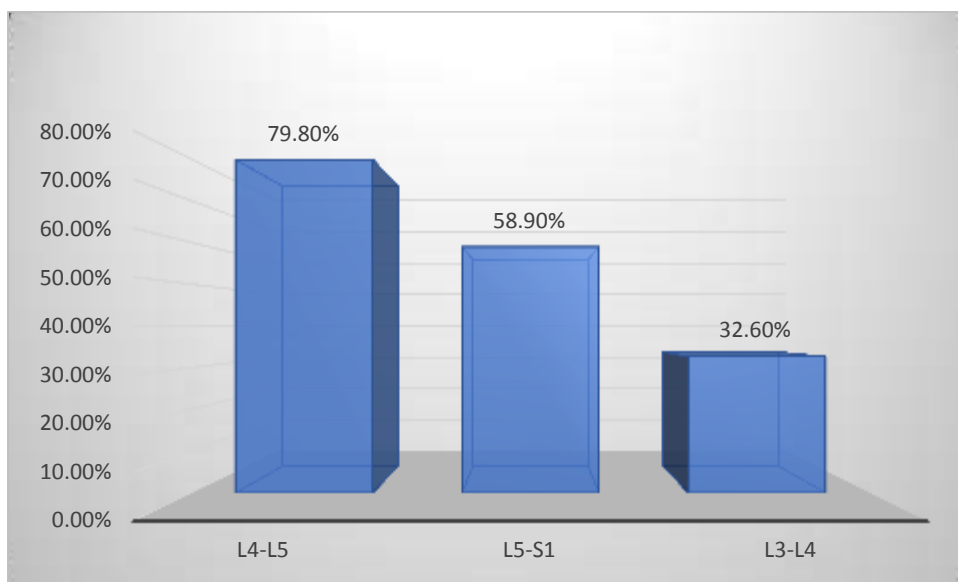


Figure 1. Various categories of disc herniation at different levels

Nerve root compression became determined in 58% (115) of the total cases. Multiple nerve compression was found in 8.09% (10) cases. Among them, central canal stenosis was observed in 70% (80), neural foraminal narrowing in 36.4% (41). Nerve root compromise was also noted most frequently at L4-L5 level (30.33% of instances), followed by L5-S1 (28.25%) and L3-L4 (9%) levels in reducing order of frequency which suggests various grades of nerve root compromise at respective disc levels. Grade 3 nerve root compression changed into the most common and became found in 79% (85) of cases with nerve root compression.

Annular tear was found in 16.20% (30) of cases and among them, 20% (5) of cases had tear at intervertebral discs. It most frequently noted involving L4-L5 intervertebral disc (72.5% of

cases), followed by using L5-S1 (24.2% of cases), L3-L4 (17.3% of cases) and L2-L3 (0.5% of cases) respectively.

Vertebral end plate changes were seen only in 9.8 % of cases (18) and most commonly at L5-S1 and L4-L5 vertebral levels with Modic type II changes (80% of cases) being most common followed by type I changes (48.6%). Type III changes had been no longer identified in any of the patients in the study group.

Discussion

This retrospective examination demonstrated the spectrum of MRI findings in patients with low back pain in our setting. The mean age for presentation with low back pain was 45 years. The age of patient presenting with low backache is in accordance with other studies (Horal, Ansari MA, and Suk et al).⁹⁻¹¹ On this look at, 57.4% of patients have been male. The male predominance was also discovered in the observations made by Horal⁹ and Ansari MA et al.¹⁰

In this study, the most common involvement was found at L4-L5 level (79.80%) and L5-S1 levels (58.90%). This is consistent with most abnormal MRI findings at the bottom levels (L4-L5 & L5-S1). Within the study done by S Verma et al,¹² in affected persons between 20-40 years, the incidence of disc degeneration became most frequent at L4-L5 level (79.80% of cases) followed by L5-S1 level (58.90%).

Multiple contiguous level disc disease became the most common involvement, noted in 105 (52%) patients observed by single level disc involvement which was noted in 84 (35.5%) patients in the present study. This finding is similar to the findings of the study done by using S Verma¹² who observed multiple contiguous level disc disease in 105 (52%) patients and single level disc involvement in 84 (35.5%) patients.

On this examination, nerve root compression was determined in 58% (115) of the total cases. Among them, central canal stenosis was discovered in 70% (80), neural foraminal narrowing in 36.4% (41). Yong et al¹³ conducted study in 60 Japanese patients, where they observed spinal stenosis in 36 (58.9%) and foramina narrowing in 18 (29.8%) patients. Higher incidence of compressive lesions in their examination as compared to the present one, may be due to racial difference. In the similar study carried out through Ansari MA et al¹⁰ in 300 Nepalese patients, nerve root compression was visible in only 39.4% of the population, neural foraminal stenosis was the commonest hassle of degenerative changes visible in 68.4% of the population and central spinal canal stenosis became seen in 52.8% of population. Higher incidence of nerve root compression and different types of stenosis was found in present study will be due to enrolment of older patients in the present study.

Findings of disc degeneration are regularly interpreted as causes of back pain, triggering both medical and surgical interventions, that are sometimes unsuccessful in alleviating the patient's signs and symptoms.¹⁴ Earlier studies have verified that imaging findings of spinal degeneration associated with back pain are also present in a large percentage of asymptomatic individuals^{15,16}. Therefore, further study comparing MRI findings in the symptomatic and asymptomatic patients might enlighten the clinical significance of degenerative changes in MRI. The limitations of the study were that it was a retrospective study, there had been much smaller number of patients and there might be variation in reporting by different radiologists.

Conclusion

This study shows spectrum of MRI findings in patients with low back pain. Disc generation is most common at L4-L5 level with multiple contiguous involvement of grade 4. Annular tear though no longer common can occur and is also common at L4-L5 level.

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