



ROLE OF MRI IN EVALUATION OF THE SYMPTOMATIC LUMBAR DEGENERATIVE DISC DISEASE: A CLINICO-RADIOLOGICAL CORRELATION

Dr. Nazlin Hemani*

3rd Year Resident Doctor, MD, Shri M.p. Shah Medical College, Jamnagar
*Corresponding Author

Dr. H. P. Parekh

Associate Professor MD, Shri M.p. Shah Medical College, Jamnagar

ABSTRACT

The present study utilizes MRI as the investigative modality to evaluate symptomatic patients with low backache with or without radiculopathy. Correlation between degree of patients' clinical findings and MRI findings is noted and an association between symptomatology and degenerative changes in spine is arrived at, with specific note for morphology of disc changes and extra-discal pathology. Occupational variables are also taken into account, in order to demarcate the contribution of physical factors to the development of degenerative spinal disease.

KEYWORDS :

INTRODUCTION

Degenerative spine disease is a major cause of chronic disability in the adult working population and a common reason for referral to an MR imaging centre. Spinal degeneration is a normal part of aging, and neck and back pain are one of life's most common infirmities. Degenerative changes of the spine may involve the disc space, the facet joints, or the supportive and surrounding soft tissues. Imaging studies are an integral component of the evaluation of the lumbar spine, indicated to look for a treatable cause. For each study there is a specific role, an appropriate indication, and a correct time for utilization during the course of a patient's illness.⁽¹⁾ MR imaging is ideally suited for delineating the presence, extent, and complications of degenerative spinal disease

AIMS AND OBJECTIVES

- To establish the role of MRI for delineating the presence, extent, and complications of degenerative spinal disease
- To investigate "abnormal" lumbar spine magnetic resonance imaging (MRI) findings, and their prevalence and associations with low back pain (LBP).
- To compare the interpretation of lumbar spine magnetic resonance imaging (MRIs) by radiologists with findings of clinical assessment in patients with lumbar disc herniation.
- To correlate the type of the disc herniation and amount of nerve root compression related to the magnitude of patient pain and disability and to establish significant other pathological findings in relation to patient's symptoms.
- To correlate relationship between alterations of the lumbar spine, visualized with magnetic resonance imaging, and occupational variables

METHODS AND MATERIALS

The present study was carried out in the Department of Radiodiagnosis of our hospital. 100 symptomatic cases of degenerative lumbar spinal disease were included, in the period from January 2022 to December 2022. Outpatients as well as the inpatients were subjected to Magnetic Resonance Imaging using Siemens' Magnetom Essenza (1.5Tesla) MRI Machine. Different pulse sequences including T1 (TR- 550, TE-11), T2 (TR-4000, TE-87), STIR (TR5000, TE-41) were used in different orientations including sagittal, axial and coronal. Axial T1 and T2 weighted scans were taken at the level of all lumbar intervertebral discs and in some cases at the level of vertebral bodies wherever required. Whole spine screening was done in every patient along with the dedicated lumbar spine scan. Image interpretation and classification of the degenerative changes was done using standard terminology. In addition, "containment" of nuclear material by the posterior longitudinal ligament was noted, and herniations further classified into Contained and Non- Contained. Clinical

severity was judged by noting patients' complaints and by clinical assessment of postural deformity, gait alteration and motor power and by the use of the Straight leg raising test, the Sciatic nerve stretch test, the Femoral nerve stretch test; and then correlated with MRI findings. Interpretation of study was done by taking into consideration the relative frequency and consistency with which individual abnormal MRI finding is found associated with patients' symptoms. The study thus helped to stratify abnormal MRI findings into clinically significant vs. clinically insignificant (in terms of symptoms). By avoiding patients with known contraindications to MRI, all avoidable risks were nullified. The following inclusion and exclusion criteria were used while selecting patients (subjects) for the study

Inclusion Criteria

1. Patients with low backache
2. Patients with unilateral or bilateral radiculopathy
3. Patients with lumbar pain on specific movements/exertions
4. Patients seeking medical aid for the symptoms between January 2022 and December 2022.

Exclusion Criteria:

1. Patients younger than 30 years of age
2. Patients with duration of symptoms less than 1 month
3. Patients with history of trauma just preceding onset of symptoms
4. Patients with past history of surgery for degenerative spinal disorder
5. Patients with known spinal tumor
6. Patients with non-degenerative spondylolisthesis
7. Patients with known contraindication for MRI eg. Pacemaker, Aneurysmal clips, Non-MR-Compatible orthopaedic prosthesis

OBSERVATION AND RESULTS

FINDING ON MRI	PATIENTS HAVING CLINICAL RADICULOPATHY (%)	FINDING OF MAJOR ROOT COMPRESSION (%)
Normal	0	0
Bulge	2	2
Contained herniation	32	32
Non-contained herniation	18	18
Sequestered	6	6

FINDING ON MRI	PATIENTS WITH RADICULOPATHY (%)	PATIENTS WITH LOW BACKACHE (%)
Normal	0	4
One protrusion	39.28	22

One extrusion	21.43	12
Multiple herniations	39.28	48
No nerve root compression	10.71	40
Nerve root compression present	89.29	60

DISCUSSION

On comparing age distribution amongst the younger age groups, i.e. age groups of 30-39 years and 40-49 years, a close correlation of percentage prevalence was noted, on comparison with the data accumulated by **Paajanen et al¹**, in which higher percentage of findings were in the 40-49 years age group.

A distinct male preponderance was found in our study, similar to findings of **Karpine et al²**.

Lower lumbar disc levels were predominantly affected in our study as well as **Kortelain et al³**, though L3-4 was the most commonly affected level in their study, as opposed to our study where L4-5 was the most common.

On comparing clinical radiculopathy with MRI findings, non contained herniations were more constantly found associated with radiculopathy than bulges in **Karppin J et al²**. In the present study however, majority were found to be contained herniations.

As with radiculopathy, herniations were found to be the most frequent disc morphology associated with nerve root compressions, in our study as well as **Karppin J et al²** study.

As compared to **Modic et al⁴**, in which 43.3% of patients referred for MRI were reported as normal; we found much lower proportion of patients with low backache referred for MRI were reported as normal (4%).

A significant correlation was found between radiculopathy and nerve root compression in the present study (89.29%) as compared to the study designed by **Modic et al⁴** (45.8%)

Out of all patients with low backache, a greater proportion of disc protrusions was noted as compared to extrusions in the present study as opposed to the previous study by **Lurie et al⁵** which took into account only patients with radiculopathy.

A significantly higher proportion of symptomatic patients were found to have vertebral body changes in addition to disc degeneration in our study(74%) as compared to the study of **Per Kjaer et al⁶**(22.4%)

A close correlation of the relative prevalence of facet arthropathy was found as compared with the previous study by **Czervionke et al⁷**.

Out of all patients with low backache, a greater proportion of disc protrusions was noted in patients with radiculopathy (71.42%) as compared to extrusions (39.28%) in the present study as opposed to the previous study by **Lurie et al⁵** which took into account only patients with radiculopathy.

CONCLUSION

After the MRI evaluation of 100 patients with low backache with or without radiculopathy, the following important conclusions were obtained.

Most patients with low backache presented in the 6th and 7th decades and showed predominant involvement of lower lumbar intervertebral disc levels. Almost twice as many men as women were referred for the investigation ~ partly attributed to adverse occupational influence on posture, as a large proportion of patients were labourers and manual workers. Multilevel involvement was found more frequently than single level involvement, with L4-5 being the most

frequently affected level. Amongst the patients presenting with low back pain, disc bulges were the most frequently noted disc changes, present at single or multiple levels in 88% of all patients with low backache.

56% patients had additional unilateral or bilateral clinical radiculopathy, of which a significant majority (50%) showed nerve root compression on MRI. A significant correlation was thus established between clinical radiculopathy and disc herniations (contained or non- contained by the posterior longitudinal ligament) causing nerve root compression (p value < 0.0001). Hence, the presence of nerve root compression noted on MRI is more likely to be associated with radiculopathy than the mere presence of a disc bulge and as a corollary, surgical relief of the compression may be more likely to relieve a patient's radiculopathy.

The same results, however, may not be expected in a patient with low backache without radiculopathy as 40% of such patients showed no demonstrable nerve root compression on MRI. So factors other than physical encroachment of the degenerated disc on the neural tissue must be responsible for the backache.

Few other findings noted in the symptomatic patients under study were vertebral body degenerative (Modic) changes (74%), facet arthropathy (38%), ligamentum flavum hypertrophy (62%)



Diffuse Bulges At All Lumbar Iv Disc Levels



Broad Based Protusion At L4-15 Iv Disc Level

REFERENCES:

1. Paajanen H, Erkintalo M, Parkkola R, Salminen J, Kormanen M (1997) Age-dependent correlation of low-back pain and lumbar disc degeneration. Arch Orthop Trauma Surg 116(1-2):106-107
2. Karppinen J, et al. "Severity of Symptoms and Signs in Relation to Magnetic Resonance Imaging Findings Among Sciatic Patients." Spine 2001; 26(7):E149-E154
3. Kortelainen P, et al. "Symptoms and signs of sciatic and their relation to the location of the lumbar disc herniation." Spine - 1985; 10:88-92
4. Modic MT, et al. "Contrast-enhanced MR imaging in acute lumbar radiculopathy: a pilot study of the natural history." Radiology 1995; 195:429-3
5. Jon D. Lurie, David M. Doman, Kevin F. Spratt, Anna N. A. Tosteson, James N.

- Weinstein; Magnetic Resonance Imaging Interpretation in Patients With Symptomatic Lumbar Spine Disc Herniations.
6. Per Kjaer, Lars Korsholm, Tom Bendix, Joan S. Sorensen, and Charlotte Leboeuf-Yde. Modic changes and their associations with clinical findings. *Eur Spine J* 2006;15:1312-19
 7. Leo F. Czervionke, Douglas S. Fenton; Fat-Saturated MR Imaging in the Detection of Inflammatory Facet Arthropathy (Facet Synovitis) in the Lumbar Spine; *Pain Med.* 2008 May-Jun;9(4):400-6.