

Original article:

Spectrum of magnetic resonance imaging findings in chronic low back pain

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ABSTRACT

Background: Chronic Low Back Pain (LBP) is one of the most common causes for consultations in outpatient clinics and specialized orthopaedic departments. Although the differential diagnosis of LBP is broad, however, the majority of patients will have nonspecific LBP. In most cases, radiology plays a key role in identifying the cause and thereby assisting in clinical decision making. First imaging modality is plain radiographs of the L-spine. In this study, MRI is the main imaging modality used in patients with LBP. The purpose of this study was to develop an imaging protocol that categorized which patients were most likely to benefit from MRI imaging to enable judicious utilization of imaging. The aim of the study was to evaluate the findings of MRI in relation to the clinical presentation of patients presenting with chronic low back pain so as to ascertain which category of patients are most likely to benefit from imaging.

Methodology: A cross sectional study was carried out at Maharishi markendeshwar medical college, Kumarhatti, Solan, Himachal Pradesh in which 100 patients were taken, who presented with history of chronic low back pain. For the present study, patients taken are those, which were referred for Lumbosacral Spine MRI examination in the department of Radiodiagnosis, over a period of 6months between November 2016 and April 2017. Patients' clinical presentation and MRI imaging findings were documented in a data collection sheet, correlated and analysed using STATA.

Results: A total of 100 patients comprising of 40(40%) males and 60(60%) females were enrolled into the study. The mean age was 46.4years. Majority of the patients worked in an office setting 48%, 32% worked as domestic workers (housewives/unemployed), 15% had manual jobs and the rest (5%) were students. Only 60(60%) patients presented with only chronic low back pain. The commonest disc diseases on MRI were disc desiccation (70%) and disc herniation (62%). Only 15(15%) patients had disc bulges (protrusion).Osteophytes alone were mainly seen in manual workers and domestic workers. Most office workers had muscle spasm. There was significant association between disc disease, osteophytosis, spinal canal stenosis and narrowing of exit foramen with lower limb numbness and radiculopathy.

Conclusion: Findings in this study showed that clinical findings correlated well with imaging findings. The commonest imaging findings were degenerative disc desiccation and herniation which were depicted on MRI. Advancing age and manual labour were important risk factors to disc disease.

Keywords: LBP-low back pain, LS-lumbosacral, MRI- magnetic resonance imaging.

INTRODUCTION

Chronic low back pain is a common complaint that can originate from many spinal column structures including: vertebrae, ligaments, facet joints, intervertebral discs, paravertebral musculature, blood vessels and spinal nerve roots. The main causes being muscular and ligamentous injuries, age related degenerative processes in the intervertebral discs and the facet joints. Others include spinal stenosis and disc herniation. It is estimated that 50%-80% of all adults will develop Low Back Pain (LBP) sometime in their lifetime ⁽¹⁾ and frequently females with peak age of 40-80years ⁽²⁾. Thorough history taking and physical examination are essential in reaching a diagnosis in patients with Chronic LBP ⁽³⁾.

This study aimed to evaluate the imaging findings of MRI in relation to the clinical presentation in patients presenting with Chronic Low Back Pain so as to ascertain the role of MRI, in these patients and to be able to develop imaging guidelines in these group of patients.

AIMS AND OBJECTIVES:

To correlate clinical presentation with imaging findings of MRI as it is the gold standard in diagnosis of chronic low back pain.

MATERIALS AND METHODS:

In the present study, 100 cases with clinical history of low back pain and radiculopathy and symptoms of numbness, presented in the department of orthopaedics, of Maharishi Markendeshwar medical college, Kumarhatti, for a period of 6 months from November 2016 to April 2017 and referred for MRI. The MRI study was performed by using Multiva 1.5 T Philips 16 channel MRI.

Eligibility criteria:

A) Inclusion criteria:
Patients with history of chronic low back pain > 4 weeks duration.

B) Patients with no lumbar surgery, prior to MRI study.

B) Exclusion criteria: a) Patients with acute low back pain < 4 weeks duration.

b) Patients with history of recent trauma.

c) Patients with known primary malignancy.

d) Patients who are contraindicated for MRI, such as metallic implants.

Data collection procedure: The patients who come to MRI due to back pain, usually had previous plain radiographs for comparison. A detailed history was taken from the patient for MRI study. This was done by researcher and technician who were conducting the MRI, using the standard data collection form. The additional details not written on the request form by the referring clinician were therefore added to ensure all required information for data collection was captured.

The main clinical features that we looked for were:

- The patients' demographic data and occupation.
- Duration of pain.
- Additional clinical features like- radicular pain, lower limb numbness, sensory deficit, neurogenic claudication and back tenderness.

The observer error in this study was minimized by ensuring that there was an agreement between the two radiologists reporting the images before a final report was given. The radiologists on duty (general radiologists) and the principal researcher gave the final report.

MRIs routinely included the following sequences in our department are Sagittal T1 and T2FSE, Axial T1 and T2FSE and axial Proton Density (PD).

RESULTS:

A total of 100 patients were included in this study. The mean age was 46.4 Years. Forty (40%) were male and 60 (60%) were female. Majority of patients worked in office settings (48%), 32% worked in domestic setting (house wives/farmers/unemployed) and 15% worked manual jobs. The rest 5% were students.

1. Demographic characteristics:

Age distribution:

Figure 1: Age distribution

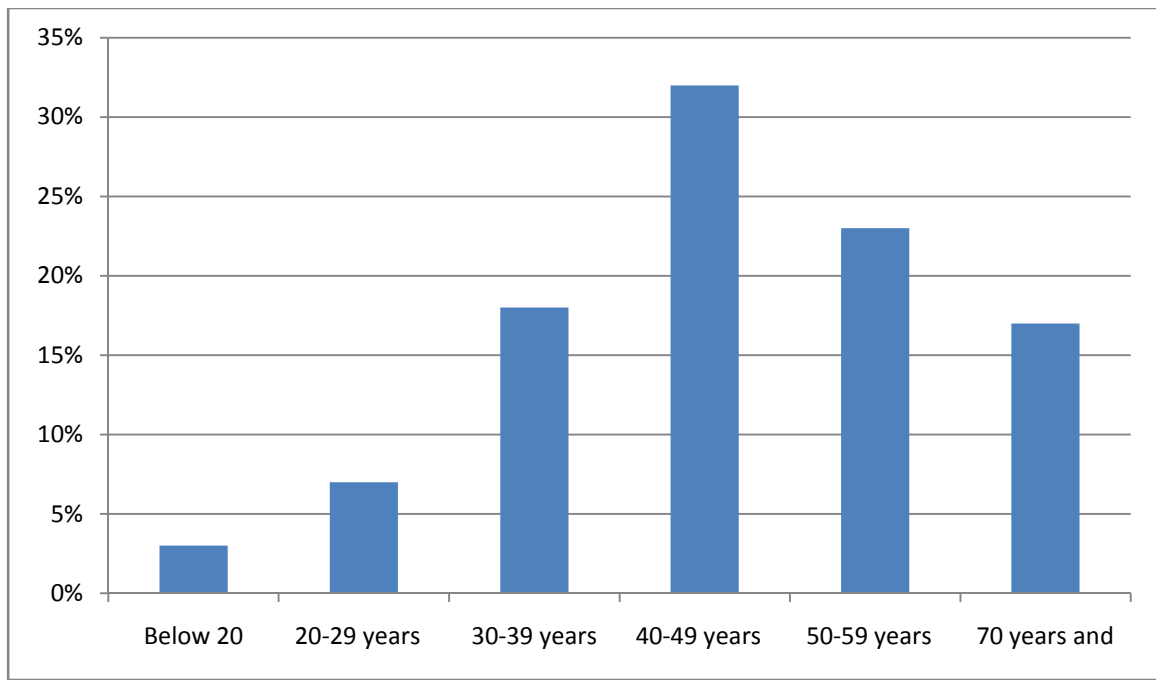


Figure 2: Gender distribution

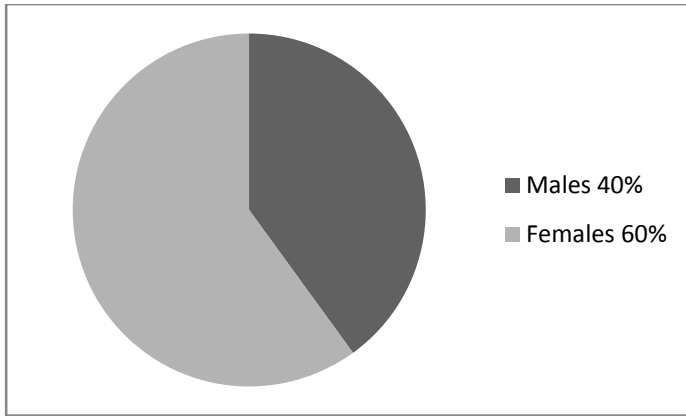


Table 1: Occupation of patients

Occupation	No. Of Patients	Percent
Manual	15	15%
Office	48	48%
Domestic(house wives/farmers/unemployed)	32	32%
Student	5	5 %
Total	100	100%

2. CLINICAL SYMPTOMS OF PATIENTS

A total of 100 patients were included in our study. All the patients had the primary complaint of chronic low back pain. 31(31%) had only complaints of LBP, and no additional clinical complaint or examination findings. 69(69%) patients had additional clinical complaints of either unilateral or bilateral radiculopathy or lower limb numbness as summarized in the table below.

Additional clinical symptoms

Table 2: Radiculopathy and lower limb numbness

		Frequency	Percent
	Left	8	8%
	Right	13	13%
	Both	62	62%
	None	17	17%
	Total	100	100.0%

3. MRI IMAGING FINDINGS

Table 3: Frequencies of diagnoses on MRI in different age groups

Age Distribution	Muscle Spasm	Disc Desiccation	Disc Protrusion	Disc Extrusion	Disc Sequestration
0-20 years	3	1	1	0	0
20-29 years	3	2	1	1	1
30-39 years	4	5	4	3	2
40-49 years	5	6	10	8	3
50-59 years	3	4	8	6	2
60-80 years	2	5	5	4	2

As illustrated in table 3, disc disease, disc desiccation and protrusion were the most common findings on MRI in the our study.

In our study, most of the patients were found to have disc disease and muscular spasm on MRI. On MRI, disc disease was either disc desiccation seen as loss in T2 signal of the disc, reduced disc height or disc herniation. These findings affected either a single vertebral level or multiple levels.

DISCUSSION:

The main objective of this study was to correlate clinical presentation and the findings on imaging using MRI as the gold standard in order to develop image guidelines for use in evaluation of patients with chronic low back pain. Disc herniation can be classified as disc desiccation, disc protrusion, disc extrusion and disc sequestration (free fragment).

The mean age of presentation of low back pain in our study was 46.4 yrs. Similar findings were also seen in findings by Cassar-Pallucino V.N, which showed by the age of fifty, 97% of individuals have a degenerated disc⁽⁴⁾. LBP was seen to be more common in females in our study (60%). Most of the women were housewives, and their daily house chores, contributed to back pain.

There were significant differences in frequencies of occurrence of positive imaging findings across different occupations. Manual workers showed highest frequencies of muscle spasms, osteophytes and disc disease. This is similar to a study by Massimo et al which showed that heavy physical work load had severe detrimental effects to the back with worsening of degenerative changes⁽⁵⁾. Heavy physical activity has been known to result in increase in osteophyte formation. Manual workers tend to be exposed to strenuous jobs hence the observations in this study.

Most of the patients in this study were office workers (48%). Most of them were seen to have

muscle spasm, likely due to incorrect posture at offices.

In present study, the most observed findings on MRI were disc disease. The commonest specific disc abnormalities were disc desiccations and disc herniation which accounted for 64% and 62% respectively.

This is similar to several studies^(1, 3) that demonstrated disc desiccation being the commonest radiological abnormality on MRI. Disc herniation was also a common finding in our study. Sixty two per cent of the studied patients had disc herniation. This was similar to a number of studies^(4, 6). The studies confirmed that disc disease including disc herniation is commonly associated with LBP. It has been shown that MRI is recognized as accurate for detecting disc herniation and classifies it into various categories. Most of the patients had multiple disc involvement, and have significant association with increasing age. The patients with radiculopathy, had higher association with narrowing of exit foramina, disc disease, osteophytosis and spinal canal stenosis, in comparison to patients with no additional complaints. Similar findings were showed in a study by Shobeiri et al⁽⁷⁾, which showed radicular symptoms and LBP, likely to have canal and neural foraminal stenosis. Herniated discs in the form of disc protrusion and extrusion are seen at L4-L5 (72%) and L5-S1 (28%) spaces, mainly in our study with patients presenting with radiculopathy.

MRI Images of L- spine (case illustrations)

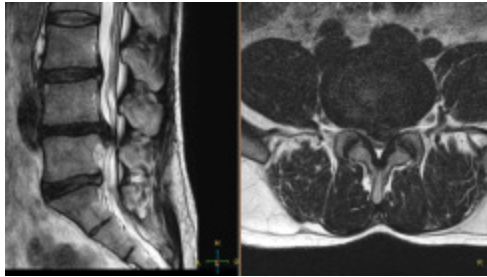


Figure1, A 46yr old female patient with chronic LBP and left sided radicular pain. MRI shows diffuse disc protrusion, left paracentral disc extrusion, disc desiccation, narrowed left neural foramina compression on left traversing nerve root with associated spinal canal stenosis.

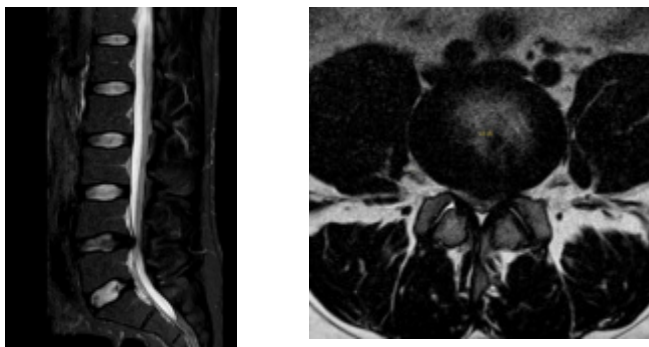


Figure 2: A 39 year old male with low back pain for 6 months and bilateral radiculopathy. MRI shows mild disc desiccation at L4-L5 with diffuse bulge and protrusion indenting thecal sac and indenting bilateral traversing nerve roots with straightened curvature (muscle spasm).

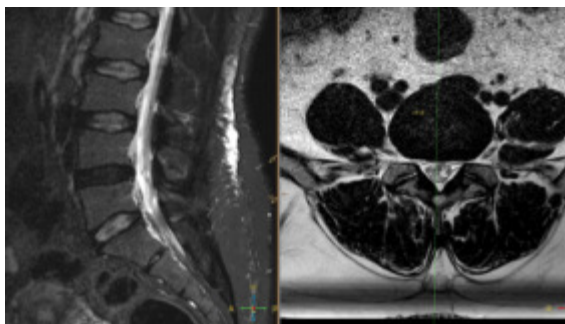


Fig 3: 28 year old female patient with low back pain. MRI shows disc desiccation and mild diffuse bulge at L4-L5 level.



Figure: 4, 40 year old female patient with history of low back pain. MRI shows L2-L3,L4-L5 & L5-S1disc desiccation and mild disc protrusions.

CONCLUSIONS:

1. Lumbar degenerative disc desiccation and disc herniation are the commonest imaging findings in patients with chronic Low Back Pain and are best evaluated by MRI. Patients with disc herniation have additional symptoms of radiculopathy.
2. Increasing Age and Manual work are important risk factors to chronic low back pain.
3. There is significant correlation between clinical features and clinically significant imaging findings in patients with chronic low back pain.

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