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Dr. Sahil Singla
Junior Resident, Department of
Orthopaedics, SGRD University
of Health Sciences, Amritsar,
Punjab, India

Dr. Rajan Sharma
Associate Professor, Department
of Orthopaedics, SGRD
University of Health Sciences,
Amritsar, Punjab, India

Dr. Rohit Sharma
Professor, Department of
Orthopaedics, SGRD University
of Health Sciences, Amritsar,
Punjab, India

Dr. Arshpreet Singh
Senior Resident, Department of
Orthopaedics, SGRD University
of Health Sciences, Amritsar,
Punjab, India

Dr. Arshpreet Singh Dhillon
Junior Resident, Department of
Orthopaedics, SGRD University
of Health Sciences, Amritsar,
Punjab, India

Dr. Satinderpal Kaur Satti
Junior Resident, Department of
Orthopaedics, SGRD University
of Health Sciences, Amritsar,
Punjab, India

Corresponding Author:
Dr. Rohit Sharma
Professor, Department of
Orthopaedics, SGRD University
of Health Sciences, Amritsar,
Punjab, India

Comparison between clinical finding and magnetic resonance imaging finding of lumbar prolapsed intervertebral disc

Dr. Sahil Singla, Dr. Rajan Sharma, Dr. Rohit Sharma, Dr. Arshpreet Singh, Dr. Arshpreet Singh Dhillon and Dr. Satinderpal Kaur Satti

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Abstract

Background: Lower back ache is most common problems seen in working population. Prolapsed intervertebral disc is one of the most common cause. Magnetic resonance imaging is the diagnostic test of choice. Disc herniation of the same size may be asymptomatic in one patient and can lead to severe nerve root compromise in another patient. So, aim and objective of the study is to compare MRI with clinical findings.

Material and Method: This study was conducted on total 60 with chief complaint of LBA was screened for inclusion in study. They underwent MRI of Lumbosacral region. All data collected and Analysed Statistically by Pearson correlation coefficient.

Results: Total 60 patients with age group between 20-50 years mean age 37.60 ± 6.36 , 45% manual Laboure, male predominance, duration 7-12 months, radiculopathy in 90% patients, SLR was positive in 82% cases. MRI was abnormal in all patients with most common finding being disc bulge 53.3%, most common level being L4-L5 and L5-S1 followed by disc degeneration, neural canal compromise. Total MRI diagnosed level L3-L4(14), L4-L5(39), L5-S1(45) and while total clinically diagnosed levels are L3-L4(4), L4-L5(23), L5-S1(33). Pearson correlation coefficient between disc degeneration-neural compromise(.577), disc degeneration-VAS (.319), disc degeneration-sensory(.360), disc degeneration-power(.417).

Conclusion: In this study Significant association has been observed between MRI finding and clinical findings in most of the patients but not all MRI findings are clinically symptomatic in patients. So, this is concluded that treating physician should put more emphasis on history, clinical examination, and make the inference by these and then should correlate the clinical findings with that of MRI to reach a final diagnosis.

Keywords: Low back pain, Magnetic resonance imaging, Disc degeneration, disc herniation, Clinic-radiological correlation, visual analogue score

Introduction

Lumbar intervertebral disc prolapsed is one of the commonest causes of low back pain [1]. Back pain is one of the most common medical problem, affecting 8 out of 10 people at same point of their lives [2]. Incidence of lower back pain is highest for those aged 30 to 50yrs [3]. Lower back ache results from many causes including degenerative changes, spinal stenosis, neoplasm, infection, trauma, and inflammatory or arthritic processes [4]. According to various studies and reports it has been confirmed that 60% to 80% of common people suffers from lower back ache minimum once in life time [5].

Lumbar prolapsed intervertebral disc is one of the most commonly associated abnormalities with lower back ache [4]. Herniation of lumbar disc causes inflammation in nerve roots and dorsal root ganglion which is induced by nucleus pulposus [6]. Due to higher weight load on lower lumbar and its connection to the sacrum, there is increased mechanical stress on corresponding disc because of which about 95% of lumbar intervertebral disc occur in L4 –L5 and L5 –S1 region [7]. Disc herniation of same size can be symptomatic in one patient and can lead to severe lower back pain in other patient [8].

Magnetic resonance imaging (MRI) is a diagnostic investigation for Prolapsed Intervertebral Disc and is a gold standard to diagnose Prolapsed Intervertebral Disc [9]. Even after high sensitivity of Magnetic resonance imaging, sometimes Magnetic resonance imaging shows abnormal findings even in the absence of clinical signs and symptoms [10]. Although Magnetic resonance imaging is a gold standard for analysis of Prolapsed Intervertebral Disc, still there is a moderate relationship between Magnetic resonance imaging findings and symptoms in the patient. It is important to identify anatomic variations in Magnetic resonance imaging to correlate with symptom in patient of lumbar disc disease [11]. Therefore it is important to correlate the clinical findings and Magnetic resonance imaging finding of lumbar Prolapsed intervertebral disc to determine the importance of abnormalities detected by Magnetic resonance imaging technique [12].

So we decided to study the comparison between clinical features and Magnetic resonance imaging findings in lumbar Prolapsed intervertebral disc and to know about its significance in decision making for treatment. The present study is conducted to determine the association between abnormalities visible in Magnetic resonance imaging and patients clinical features including pain distribution, neurological signs, and symptoms in lumbar Prolapsed intervertebral disc.

Material and Method

Study design: Observational, descriptive and Cross sectional study.

Setting: This study will be conducted in Sri Guru Ram Das charitable hospital attached to Sri Guru Ram Das Institute of Medical Sciences And Research, Amritsar. who had isolated prolapsed intervertebral disc of lumbar region aged between 20 yrs. to 50 yrs. of age fulfilling the inclusion criteria.

Data Sources: All patients of lower Back ache with Radiculopathy will undergo Magnetic resonance imaging at Sri Guru Ram Das Institute of Medical Sciences And Research and then Magnetic resonance imaging findings are compared with their clinical findings in patients.

Method: This study will be conducted on total 60 patients of age group 20 yrs. to 50 yrs. of age presented to outpatient department of Shri guru ram das institute of medical sciences and research, Amritsar with clinical features of lower limb radiculopathy will be screened for inclusion in study. The patient with clinical diagnosis of lumbar disc prolapse fulfilling inclusion criteria included in study.

Inclusion Criteria

All patients between 20 yrs. to 50 yrs. of age having:

- (i) Chronic low back pain From 6 months as chief complaint.
- (ii) Radicular low backache radiating to one or both lower limbs.
- (iii) Nerve root tension signs like straight leg raising test (SLRT), lasegue test, femoral stretch test.
- (iv) Presence of neurological signs and symptoms

Patients with following features will be excluded from study

Exclusion Criteria

1. History of trauma or operative intervention for low backache.

2. Non manageable severe claustrophobia.
3. LBP due to infective or neoplastic aetiology.
4. Acute onset of symptoms
5. Patient having radicular symptoms for the first time were treated with simple bed rest and analgesics for 3 weeks and patients who had completely recovered

All patients underwent Magnetic resonance imaging evaluation. Magnetic resonance imaging findings analysed were disc degeneration, disc prolapse, neural foramen compromise, nerve compression

Straight Leg Raise Test: The straight leg raise test is performed with the patient in a supine position. by gently raising the patient's leg by flexing the hip with the knee in extension, and the test is considered positive when the patient experiences pain along the lower limb in the same distribution of the lower radicular nerve roots. This test is considered positive between 30 to 70 degrees [13].

Femoral Stretch Test: The patient lies prone, the knee is passively flexed to the thigh and the hip is passively extended. The test is positive if the patient experiences anterior thigh pain. This test is usually positive for L2-L3 and L3-L4 protrusions [14].

Lasegue Test: After performing SLR test slight lower down the leg and dorsiflex the foot, if patient experiences radiating pain then this test is considered positive [15].

Allocation of groups: In study group total of 60 patients was taken with lower back pain. Clinical findings and magnetic resonance imaging finding of Prolapsed intervertebral disc in these patients was compared.

The standard radiographic evaluation will include a Magnetic Resonance imaging of Lumbosacral region.

Sample size: 60 patients

Statistical Methods: All data was collected and Analysed Statistically by Pearson correlation coefficient.

Results: This study included total 60 patients aged between 20-50 years with 53.3% patients between 30-40 years of age with mean age 37.60 ± 6.36 (TABLE -1). This study shows male predominance with 56.7% males and 43.3% were females with maximum number of patients were manual labour (45%). Maximum number of patients had symptoms from 7-12 months of duration (55%) TABLE -1. Total 70% of patients had previous episodes of pain with only 30% of patients had affected routine activity. 54 out of 60 patients had lower limb radiculopathy (Figure -1) either unilateral or bilateral with SLR positive in total 49 patients (Figure-2). 47% patients had numbness and 63% patients had lower limb weakness that means motor symptoms appear earlier than sensory symptoms. 17 patients had abnormal knee and 21 patients had abnormal ankle reflexes as also seen that most common level of disc herniation is L5-S1(55%) followed by L4-L5 (38.3%) followed by L3-L4(6.7%) Figure-3 and most common type of disc herniation is disc bulge (53.3%) followed by protrusion (36.7%) followed by extrusion(10%) TABLE-2and maximum 41.7% patients had level II disc degeneration (Table-2). 40% patients had level I neural canal compromise. Total MRI diagnosed level L3-L4(14), L4-L5(39), L5-S1(45) and while total clinically diagnosed levels

are L3-L4 (4), L4-L5(23), L5-S1 (33) that shows that MRI may show levels of disc involvement but not all levels shown on MRI are clinically symptomatic (Figure-4,5,6.). Pearson correlation coefficient between disc degeneration-neural compromise (.577), disc degeneration-VAS (.319), disc degeneration-sensory(.360), disc degeneration-power (.417) TABLE-3.Pearson correlation between MRI and Clinical Findings of lumbar PIVD shows positive correlation between these two findings showings if Disc degeneration on MRI

increases then neural compromise, sensory and power loss increases and visual analogue score increases.

Table 1: Case distribution based on age and duration of symptoms

Age	N	%	Mean±SD	Duration	N	%
20-30	7	11.7	37.60±6.36	< 6 months	9	15.0
31-40	32	53.3		7 – 12 months	33	55.0
41-50	21	35.0		>13 months	18	30.0
Total	60	100.0		Total	60	100.0

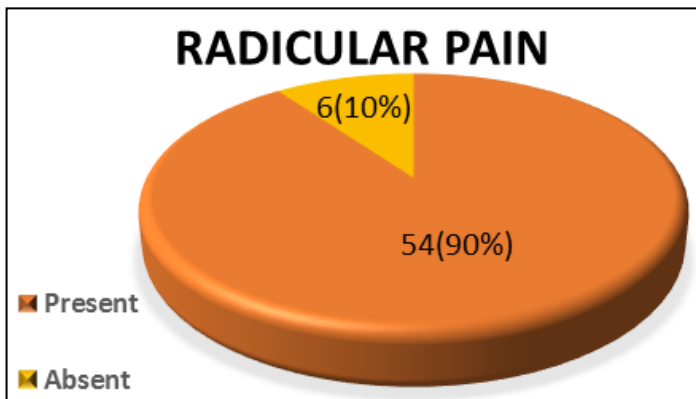


Fig 1: Cases based on radicular pain

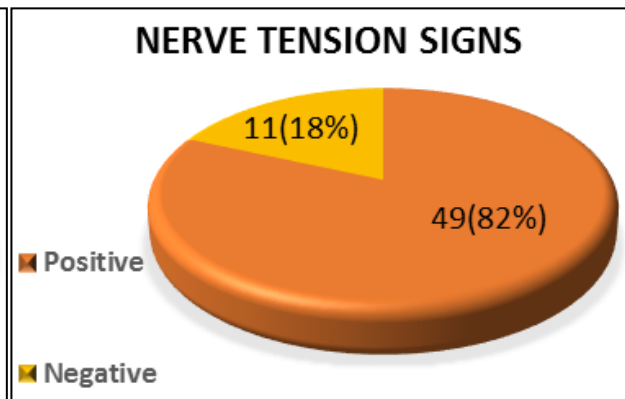


Fig 2: Cases based on nerve tension signs

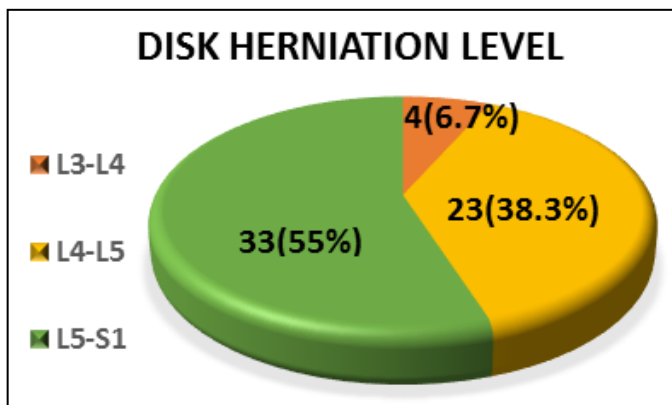


Fig 3: Case distribution based on disc herniation level

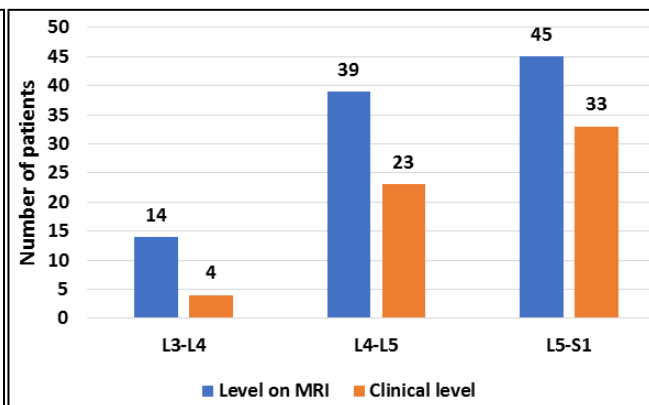


Fig 4: Cases based on MRI and clinically diagnosed levels

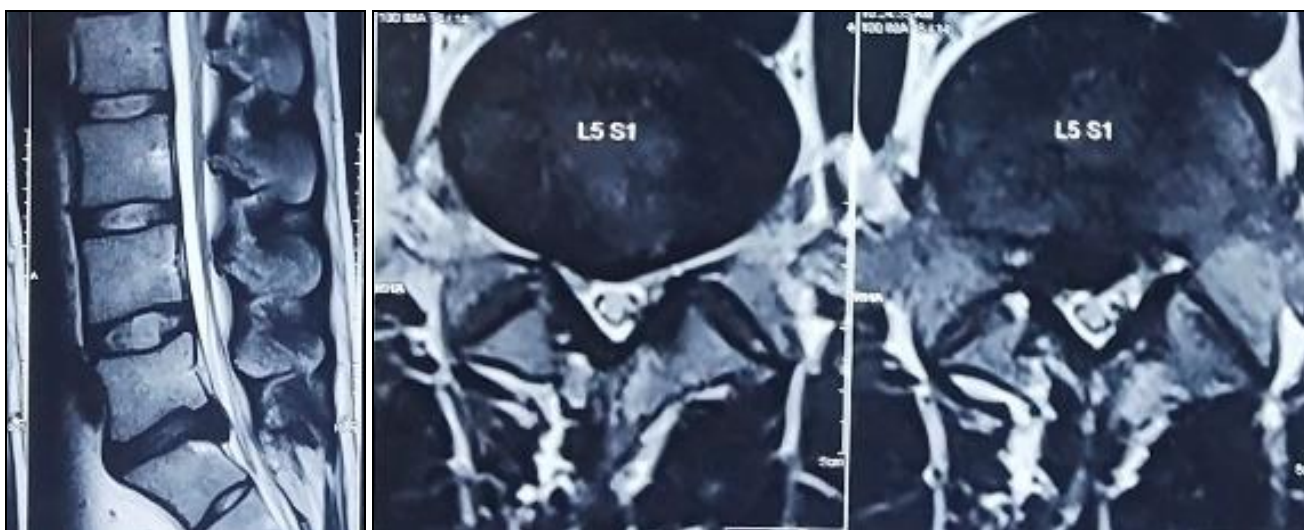


Fig 5: 34years old male pain from 9 months with B/L radiculopathy with L5-S1 disc herniation with neurological sign and symptoms at level of L5-S1

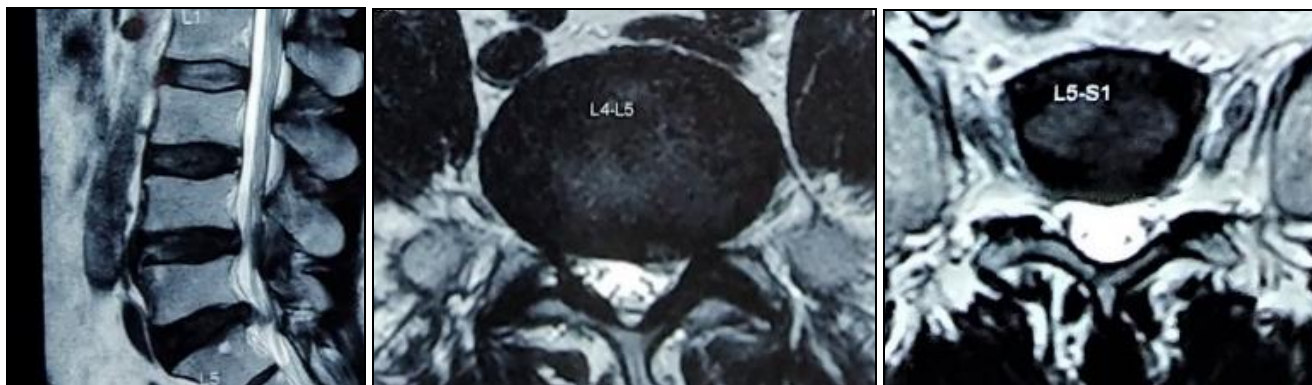


Fig 6: 27years old male pain from 8 months with L4-L5, L5-S1 disc herniation level with neurological sign and symptoms at level of L5-S1

Table 2: Cases based on disc herniation type and grade

Disk herniation type	N	%	Disc degeneration	N	%
Bulge	32	53.3	Level I	19	31.7
Protrusion	22	36.7	Level II	25	41.7
Extrusion	6	10.0	Level III	16	26.7
Total	60	100.0	Total	60	100.0

Table 3: Pearson correlation coefficient between clinical and MRI findings

	Pearson Correlation	Significance
Disc degeneration VAS	0.319	0.013
Disc degeneration Sensory	0.360	0.005
Disc degeneration Neural compromise	0.577	0.000
Disc degeneration Power	0.417	0.001

Discussion

The present study was conducted to find out the correlation between the MRI findings and Clinical findings of lumbar PIVD on total 60 patients presented to OPD of sri guru ram das university of health sciences, Amritsar with lower back pain. In this study age of patients is from 20 years to 50 years with mean age of 37.60 years and most of the patients were in age group of 30 to 40 years. which was also a finding of Farhana Younis who found that LBA is most common in age group of 30-39 years. Age range was from 20 – 79 years (mean age 47 years). Maximum patients were in the age range from 30 – 39 years (30.6%) followed by 40 – 49 years (24.7%) [16].

In the present study there is significant correlation between occupation of patient and development of lumbar disc prolapse with maximum patients were manual labourers which was also according to a study conducted by sharma *et al.* [17]. In this study on total 60 patients 57% of patients were male population that means of male preponderance because of more outdoor activities by males also in relation to study by rahman MH in which there were 74.1% patients were male and 25.9% patients were female [18]. In this study conducted on 60 patients routine activity was hampered only in 30% patients which was according to the study did by Rainvillie *et al.* [19]. In the present study this was found that the with increase in disc herniation level there is increase in neural canal compromise but this is against study conducted by rai et which found that there is no significant correlation between these two terms [20].

In the present study 90% of the patients had complaint of radiculopathy which was correlated to study conducted by

stankovic which found that 70% of the patients had lower limb radiculopathy. In my study it is 90% because patients of rural areas seek medical care very late [21]. In my studies there are 82% of the patients have positive SLR test which is also concluded by a study conducted by Bajpai J who found positive SLR in 86% cases [22]. There is a significant correlation between lumbar disc prolapse, neural canal compromise and sensory deficit which was analysed by Vroomem and krom and they found that the it is highly sensitive for the proper diagnosis of lumbar PIVD and in my study 47% of patients had sensory deficit and had same level on MRI investigation [12]. In this study 55% of the total patients had L5-S1, 38.30% had L4-L5 and 6.70% of total patients had L3-L4 level of disc involvement which was comparable to the one study conducted which had two (4%) disc L3-L4 level, in 44% of the cases, PIVD was present at L4-L5 level and in 52% of the cases it was present at L5-S1 level, comprising 96% of total cases at L4-L5 & L5-S1 levels [23]. In the present study total 53.3% of patients had disc bulge, 36.7% had disc protrusion and 10% of patients had disc extrusion which was similar to study conducted by Pfirrmann *et al.* in which he found that 48% had disc bulge and 15% had disc extrusion (p value < .001) [24]. In this study we found that there were multiple disc degeneration levels on MRI but not all levels are clinically significant and symptomatic. Which was also concluded in study conducted by janardhana in which they found In their study, out of 169 levels of disc lesions only 89 are symptomatic, that means not all MRI levels are symptomatic [25]. In our study there is a significant correlation between MRI and Clinical findings of lumbar PIVD with pearson correlation coefficient value more than 0. Which was similar to study conducted by beattie *et al.* [26], Keshavarz *et al.* [27], Farhana yonis *et al.* [16], Janardana Ap *et al.* [25], Bajpai *et al.* [22], Rai *et al.* [20],

Conclusion

The patients who have lower back pain usually present with a number of symptoms that are not labelled with specific diagnosis. So, major task for the examining doctor to find out the accurate clinical findings, test for diagnosis and then develop a proper treatment plan for these patients. For this proper approach includes history, clinical examination, neurological findings and evaluation with MRI.. In the present study it is observed that there is a good correlation between clinical findings and MRI findings of lumbar PIVD but not all MRI findings need to be investigated and not all MRI findings are symptomatic in patients. MRI shows multiple disc level involvement but clinically all levels are not symptomatic So, this can be safely concluded that the treating physician should put more emphasis on history, clinical examination and then

correlate these findings with MRI findings to reach final diagnosis and treatment.

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