



COMPARATIVE STUDY BETWEEN CLINICAL FEATURES AND MRI FINDING IN LUMBO-SACRAL DISC PROLAPSED

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ABSTRACT

The Lumbar disc prolapse is considered one of the most common causes of low back pain. As it may affecting the working population that's way it is regarded as major socioeconomic problem. The advances of MRI it become the first choice modality in assessment of patients with disc prolapse . As it is non invasive, non ionizing imaging modality. Eighty three patients 47 male and 36 female was included in this study and all patients were examined clinically and there MRI result was evaluated from January 2013 till January 2017. The pain distribution with respect to dermatome level were recorded. So total (58) L5 dermatomes involvement and (37) S1 dermatomes involvement and (8) L4 dermatomes involvement. There are 52 patients have neurological symptoms 28 patients at L5 level, 13 patients at S1 level, 3 patients at L4 level while 8 patients have neurological symptoms at 2 level 2 of them have neurological symptoms at L4 and L5 level and other 6 patient at L5 and S1 level. Out of 83 patients there are 23 patients have neurological deficit 13 patient have motor and sensory while other 10 patients have only sensory deficit. Ten patients have more than one level. Seven patient's sensory deficit at L5 and S1 level and other 3 patients at L4 and L5 level. One hundred forty one herniation in 83 patients. Disc bulge were 89, Disc protrusion 43 and disc extrusion were 9.

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INTRODUCTION

The Lumbar disc prolapse is considered one of the most common causes of low back pain.¹ As it may affecting the working population that's way it is regarded as major socioeconomic problem. With time the diagnosis and treatment of disc prolapse advance greatly.² Many radiological modalities such as X ray radiography , computed tomography (CT) and myelography were used but with many limitations, the spinal radiography showed mainly bony abnormalities .while the computerized tomography scan provides more bony details with little soft tissue components and the conventional myelography provides indirect information about the contents of the spinal canal.³ The advances of MRI it become the first choice modality in assessment of patients with disc prolapse .as it is non invasive , non ionizing imaging modality.² Many abnormalities can be assessed on spinal MRI, including degree of disc herniation, nerve root impingement, disc degeneration and high intensity zone / annular tear. ⁴ The MRI is done routinely for any patients with suspected lumbar disc prolapse, as it is reported high sensitivity of this imaging

modality in assessment of disc prolapse.^{1,5} Although still controversy which of the MRI findings are clinically relevant.¹ Some studies claimed That loss of disc height or abnormal signal intensity is highly predictive of symptomatic tears and the presence of a disc bulge or protrusion does not have additional significance.⁶ One of the studies found that MRI findings were not predictive of the development or duration of low back pain .⁷ Therefore, it is important to define the relation between MRI findings and clinical features.

History and Physical Examination: Sciatic pain not to be considered specific for disc prolapsed, there are many conditions which may cause same radiating pain like sciatica. Pain which is more sever in the leg than back, same dermatome distribution of neurological symptoms (like numbness, pain and cold sensation) or pain which is worse with Valsava maneuver (during coughing, sneezing or straining).⁸ Most of the patients with disc prolapsed present with sciatica but less common symptoms like sensory and motor deficit can occur. When there is suspicion during examination of lumbar disc herniation a full physical examination must be done to the pelvis and lower limbs with neurological examination to evaluate strength, sensation and reflexes. Provocative tests such as straight-leg-raising is the

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most sensitive test for lumbar disc prolapsed, in spite that that it is not specific. A negative result strongly indicating no disc prolapsed.⁹ The straight-leg-raise test can be done the patient in supine position or seated, but it is test more sensitive in supine position for lumbar disc prolapsed. It is performed by flexion the hip joint at (30 to 70) degrees, and with smaller angle there is high suspicion of disc prolapsed. Crossed straight-leg-raise test is another test which can be performed by lifting the opposite an affecting leg and observe pain radiation in the affecting leg; a positive result is more specific for lumbar disc prolapse. Weak ankle dorsiflexion, absent ankle jerk all are specific for lumbar disc prolapsed. Calf muscle weakness taking 4-6 weeks to appear and it is a late sign and indicate sever neuromotor dysfunction. Demarcation of radiculopathy to specific nerve root may be found.⁸ Determination clinical signs and symptoms of the involve nerve root help to correlate with MRI finding. So L3 and L4 radiculopathy associated with abnormal patellar reflex, L5 radiculopathy, loss of sensation on the dorsum of the foot while S1 radiculopathy there is weak ankle jerk and loss of sensation on the lateral heel.^{10,11}

Examination

Observation: Sciatic Scoliosis: on examination the patient may stand with slight bending to one side which increase during bending forward, there is restriction of movement in all planes.

Palpation: By palpation there is tenderness in the midline of lower back and spasm of paravertebral muscle.

Special Tests

A-Straight Leg Raise - Limited and painful on the affected side.

B-'Crossed Sciatic Tension' - Raising the unaffected leg may cause sciatic tension on the affected leg.

C-Femoral Stretch Test - May be positive if nerve root of L3/4 is affected.

Neurological Examination

At the same level of prolapse, you may find: Muscle weakness (later wasting), Diminished reflexes or Sensory loss.

MATERIALS AND METHODS

All patients they presented to private clinic were examined clinically for pain distribution and x-ray was taken to exclude other pathology. The dermatome levels and neurological signs were recorded. Eighty three patients 47 male and 36 female was included in this study and all patients were examined clinically and there MRI result was evaluated from January 2013 till January 2017. From 83 patients 14 patients in age (21- 30 y), 26 patients in age (31 – 40 y), 10 patients in age (51 – 60 y) and 14 patients above 61 years of age.

Clinical methodology: The criteria used for dermatome level are (14) : L3-level cause neurological symptoms and pain which radiate toward anterior part of the thigh and knee joint, while L4-level give pain and neurological symptoms from lower knee joint down to medial surface of the leg. L5 level give signs and symptoms toward antero-lateral surface of leg down to the foot.

S1 level: the pain and neurological symptoms reach to posterior surface of the leg and sole of the foot, Nerve root compression on MRI corresponding to muscle weakness or wasting and sensory involvement according to clinical examination. Miscellaneous finding like pain at the gluteal region or posterior surface of thigh are not specific for any mentioned of above level.

Radiological Methodology: All patients included in this study were send them for MRI and their MRI results recorded as follow: disc degeneration, disc prolapsed, neural foramen compression, nerve root compression and other miscellaneous finding like facet joint arthropathy, hyper atrophy of ligament flavum and spinal canal stenosis. Disc herniation was classified as follows; a) Normal: No disc extension beyond the interspace. b) Disc bulge: Circumferential symmetrical disc extension beyond the interspace. c) Disc protrusion: Focal or asymmetrical disc extension beyond the interspace with base against the parent disc broader than any other diameter of the protrusion. d) Disc extrusion: Focal obvious disc extension beyond the interspace with base against the parent disc narrower than the diameter of the extruding material itself or no connection to parent disc. Neural foramen compromise was graded as neural foramen compromise, nerve root contact, and nerve root compression (15).

RESULTS

Clinical features: The pain distribution with respect to dermatome level was recorded. L5 38 and S1 23 dermatomes were involved. L4 dermatomes involved in 2 patients. In 20 patients there are 2 levels involvement L4 and L5 recorded in 6 patients while 14 patients were in L5 and S1. So total 58 L5 dermatomes involvement and 37 S1 dermatomes involvement and 8 L4 dermatomes involvement.

Neurological symptoms: There are 52 patients have neurological symptoms 28 patients at L5 level, 13 patients at S1 level, 3 patients at L4 level while 8 patients have neurological symptoms at 2 level 2 of them have neurological symptoms at L4 and L5 level and other 6 patient at L5 and S1 level.

Neurological deficit: Out of 83 patients there are 23 patients have neurological deficit 13 patient have motor and sensory while other 10 patients have only sensory deficit. 10 patients have more than one level. 7 patient's sensory deficit at L5 and S1 level and other 3 patients at L4 and L5 level.

MRI finding: MRI results recorded 188 level of disc herniation.

Disc degeneration: 66 (62.8%) disc degeneration grade 4 and above at 2 or more level while 39 (37.1%) disc degeneration at 3 or more level (grade 4 and above).

Disc herniation: A 141 herniation in 83 patients. Disc bulge were 89, Disc protrusion 43 and disc extrusion were 9.

- Neural foramen compression and nerve root compression
- Neural foramen compression: There are 90 neural foramen compressions out of 141 levels in 83 patients.
- Nerve root compression: There are 43 patients with nerve root compression.

- In 89 disc bulge there are 74 neural foramen compressions and 12 root compression.
- In disc protrusion there are 10 neural foramen compressions and 20 root compressions.
- In disc extrusion there are 6 neural foramen compression and 11 root compressions.
- Relation with neural foramen or nerve root
- In protrusion (20) level L3 central and 7 Centro – lateral.
- In extrusion (11) level L4 central and 7 Centro – lateral.

Nerve root compression related well with clinical symptoms. In disc extrusion there are 11 nerve root compression (100%) while in disc protrusion there are 19 nerve root compression (95%) and in disc bulge there are 8 nerve root compression (66%). In neural foramen compression the relation occurs with disc extrusion only (83%) while poor relation in case of disc bulge or protrusion.

4- Relation between type of disc herniation and clinical symptoms.

Table 1. Relation between MRI disc level and dermatome level

MRI disc level with dermatome	No.	percent
Radiculopathy L4 producing L3-L4	2	2.40%
L4 and L5 producing L3- L4	1	1.20%
Radiculopathy L5 producing L4-L5	34	40.96%
L4 and L5 Radiculopathy L4- L5 producing	6	7.32%
Radiculopathy S1 producing L4-L5	3	3.61%
Radiculopathy producing L5 and S1 L4-L5	2	2.40%
L5-S1 producing L5 Radiculopathy	1	1.20%
L5-S1 producing S1 Radiculopathy	20	24.10%
L5-S1 producing L5 and S1 Radiculopathy	14	16.87%
Total	83	100%

Table 2. Relation between type of disc herniation and clinical symptoms

	Neural compression	Symptomatic		Asymptomatic		Total
		No.	percent	No.	percent	
1- Disc bulge	With neural foramen compression	23	31.08%	51		74
	Nerve root compression	8	66.66%	4	33.33%	12
2- Disc protrusion	With neural foramen compression	3	30%	7	70%	10
	Nerve root compression	19	95%	1	5%	20
3- Disc extrusion	With neural foramen compression	5	83.33%	1	16.66%	6
	Nerve root compression	11	100%	0	0%	11

MRI finding	symptomatic		deficit		Without symptoms		total
	No.	%	No.	%	No.	%	
No foramen compression	0	0%	0	0%	24	100%	24
Neural foramen compression	37	41.11%	10	11.11%	43	47.77%	90
Neural root compression	30	69.77%	13	14.44%	0	30.23%	43

Correlation of Result

Eighty three patients 47 male and 36 female was included in this study and all patients were examined clinically and there MRI result was evaluated from January 2013 till January 2017. From 83 patients 14 patients in age (21- 30 y), 26 patients in age (31 – 40 y), 10 patients in age (51 – 60 y) and 14 patients above 61 years of age. House wife was 24, manual laborers was 34 and 25 patients was professionals.

- Correlation between disc degeneration and symptoms. There is 100% correlation between disc degeneration record by MRI and backache probably because all patients complaining from chronic back pain.
- Correlation between symptomatic level and MRI level L5 was the commonest dermatome involvement (58) level, S1 at (37) level and L4 at (8) level.

All MRI reading correlate with dermatome level except in 6 patients there is no correlation.

3- Relation between type of disc herniation and clinical symptoms

The foramen compression relate well with clinical symptoms regardless the type of disc prolapse but relation more with neural root than with neural foramen compression.

5- Relation between neural deficit and neural canal compression seen by MRI.

Neural deficit related better with neural root compression than with neural foramen compression.

6- Relation between position of the disc (in protrusion and extrusion) and neurological symptoms. 43 disc protrusions was recorded 25 central (16) without symptoms and only (9) with symptoms and 18 centro-lateral (13) with symptoms and only (5) without symptoms while in extrusion (3) central (2) of them symptomatic and (1) asymptomatic. In centro-lateral there are (6) all of them symptomatic. So centro-lateral related better than central in extrusion and protrusion.

DISCUSSION

In this study we compare a result of clinical examination and MRI finding which was recorded and read by radiologist for a total of 83 patients included in this study. 47 where male and 36 female, 34 patients was laborers, 24 house wife while 25 are professionals. Male predominance was 56.6% and result is

near to result by Takahashi *et al.*¹ and rate more than result observed by Jensen *et al.*^{2,3} In our study from a total 83 patients there are 34 laborers (40.96%) and 25 professionals (30.1%) and 24 house wife (28.96%) we agree with other studies such as Panjabi *et al.*⁴ That occupation play an important role in development of disc prolapsed while we disagree with result proved by Damkot *et al.*⁵ And Wilder *et al.*⁶ that said no relation between work environment and back pain. All patients complaining from chronic backache have degeneration of disc by MRI reading so there is 100% relation between clinical features and MRI finding. Although L5 affected mostly at L4-L5 level (74%) It affected (24.8%) at L5-S1, Also S1 mostly affected at L5- S1 (91.8) while in 8.1% it is affected at L4-L5 level. L4 affected mostly at L4-L5 (62.5%) and (37.5%) at L3-L4 level. The dermatome level and clinical distribution matched together in most of cases, in spite of that there are (6) clinical level not correlate with MRI reading and this important when patient need surgery so MRI finding guide surgeon to exact level involvement. In our study 53% of the patients had L4-L5 disc prolapsed and 43% of patient have disc prolapsed at L5-S1 level which is higher than the study of Garrido *et al*, which found that 43% of the patient who had lumbar disc prolapsed were having L4 L5 level disc involvement.⁷ Regarding nerve root compression and neural canal compression in relation to the type of disc herniation, nerve root compression causing symptoms more than neural foramen compression despite type of disc herniation, whether bulging, protrusion or extrusion. So in disc extrusion there is (100%) symptomatic nerve root compression, (95%) symptomatic nerve root compression and (66%) in disc bulge. While in neural foramen compression it was no relation except in disc protrusion (83%) symptomatic. Neural deficit also related more to neural root compression than neural foramen compression, in our study we found that (30.2%) of neural deficit due to neural root compression and only (21.2%) deficit in case of neural foramen compression. We agree with the result of done by Weise *et al.*⁸ who found an abnormality in ankle tendon reflex in (36%) of patients. The position of the disc in disc protrusion and extrusion is related to clinical symptoms. In our study there are (43) disc protrusion (25) central, only (9) causing symptoms (36%) while in other (16) it is without symptoms (64%). Centro-lateral protrusion causing symptoms in (13) level (72.2%) and only (27.8%) without symptoms. In disc extrusion there are (3) central (2) of them are symptomatic (66.6%) while all (6) level Centro-lateral (100%) so centro-lateral position of the disc related more to clinical symptoms than central and disc extrusion causing distal leg symptoms more than protrusion, this result is comparable to other studies. (9, 15)

Conclusion

In our study the clinical features are well related to MRI finding. By detailed history and full examination we can follow patients with symptomatic lumbo-sacral disc prolapse but when surgery is plane to be done MRI examination is essential to recognize the exact diseased site involvement.

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