Original Research Paper

Radiodiagnosis

COMPARISON OF PLAIN RADIOGRAPHY AND MRI LS SPINE IN THE EVALUATION OF SPINAL CANAL STENOSIS

Dr.Yash Sharma*	Resident, Department of Radio-diagnosis Dr. Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar. *Corresponding Author
Dr.Susil Kachewar	Professor and HOD, Department of Radio-diagnosis Dr. Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar.
Dr.Dilip Lakhkar	Professor, Department of Radio-diagnosis Dr. Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar.

ABSTRACT

Background: Lumbar spinal stenosis is a narrowing of the spinal canal which causes compression of the neural tissue. Despite the advantages of using MRI for the diagnosis of lumbar canal stenosis, MRI is not a cost-efficient tool for screening patients for lumbar canal stenosis. Alternatively, plain radiographs are superior for screening due to low cost and availability.

Aim: 1. To describe the plain X ray & MRI findings in patients with spinal canal stenosis
2. To compare and correlate the MRI findings with findings of plain radiography

Results: Sensitivity and specificity of X-ray with respect to MRI was 0% and 100% while accuracy was 56% at L1 level
Sensitivity and specificity of X-ray with respect to MRI at L2 level was 0% and 100% respectively while accuracy was 44%.
Accuracy of X-ray with respect to MRI at L3 level was 52%, and its specificity and sensitivity was 100% and 29.4% respectively.
Accuracy of X-ray with respect MRI to at L4 level was 40% and its sensitivity and specificity were 21.05% and 100% respectively.
Sensitivity of X-ray with respect to MRI at L5 level was 24.59% and accuracy was also 26%

CONCLUSION: X-ray is a cost-effective, non-invasive imaging modality that is useful in cases of space occupying lesions and osteoporosis, but is not a diagnostic modality of choice in neurological/soft tissue related causes of low back ache.
MRI helps in better characterization of most musculoskeletal diseases of the spine as compared to X-ray. MRI is a better and more informative imaging modality in evaluation of spinal canal stenosis.

KEYWORDS : X-RAY, MRI, LUMBAR CANAL STENOSIS

INTRODUCTION:

Lumbar spinal stenosis is a narrowing of the spinal canal which causes compression of the neural tissue. The normal lumbar spinal canal diameter ranges between 15-27 mm. A diameter of less than 12 mm indicates stenosis and less than 10 mm is definitive stenosis. Many imaging-based criteria have been suggested in the past[1-8] but were based on inconsistent imaging modalities [9,10], heterogeneous populations, lacked control groups, and generalized measurements of the entire lumbar spine. Despite the advantages of using MRI for the diagnosis of lumbar canal stenosis, MRI is not a cost-efficient tool for screening patients for lumbar canal stenosis. Alternatively, plain radiographs are superior for screening due to low cost and availability. Hence the present study was done at our tertiary care center to describe the plain X ray & MRI findings in patients with spinal canal stenosis, to compare and correlate the MRI findings with findings of plain radiography.

AIMS AND OBJECTIVES:

To describe the plain X ray & MRI findings in patients with spinal canal stenosis
To compare and correlate the MRI findings with findings of plain radiography

MATERIALS AND METHOD

STUDY DESIGN AND POPULATION: The present study was a Observational comparative study undertaken to compare plain radiography and MRI LS spine in the evaluation of spinal canal stenosis in a tertiary care hospital who underwent MR lumbosacral spine imaging and X-ray lumbosacral spine imaging in the Department of Radio-diagnosis and were diagnosed with spinal canal stenosis.

SAMPLE SIZE: 125 Patients.
INCLUSION CRITERIA :
1.Patient presenting with low back ache and are diagnosed with spinal canal stenosis on MRI.

EXCLUSION CRITERIA:

1. Cardiovascular devices- pacemaker
2. Pregnancy
3. Claustrophobia
4. Patients unable to stand for x-ray

OBSERVATIONS AND RESULTS:

1.Distribution of study population according to gender

Gender	Number
Female	60
Male	65

2. Distribution of stenosis according to MRI findings:

Severe stenosis at L1 level was found in 28% cases, severe stenosis at L2 level was present in 24% cases while severe stenosis at L3, L4 and L5 levels were 48%, 68% and 80% respectively.
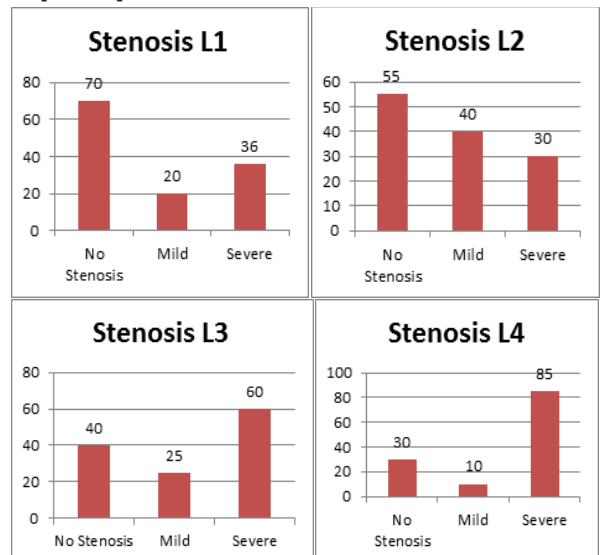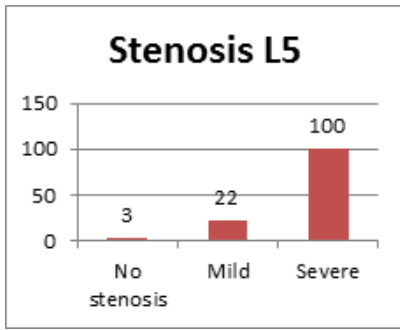
3. Sensitivity and specificity by MRI and X ray:

For L1 stenosis:

X ray stenosis L1	MRI stenosis L1	
	Yes	No
Yes	0	0
No	55	70

Sensitivity and specificity of X-ray with respect to MRI was 0% and 100% while accuracy was 56% at L1 level

For L2 stenosis:

X ray stenosis L2	MRI stenosis L2	
	Yes	No
Yes	0	0
No	70	55

Sensitivity and specificity of X-ray with respect to MRI at L2 level was 0% and 100% respectively while accuracy was 44%.

For L3 stenosis

X ray stenosis L3	MRI stenosis L3	
	Yes	No
Yes	25	0
No	60	40

Accuracy of X-ray with respect to MRI at L3 level was 52%, and its specificity and sensitivity was 100% and 29.4% respectively.

For L4 stenosis:

X ray stenosis L4	MRI stenosis L4	
	Yes	No
Yes	20	0
No	75	30

Accuracy of X-ray with respect MRI to at L4 level was 40% and its sensitivity and specificity were 21.05% and 100% respectively.

For L5 stenosis

X ray stenosis L5	MRI stenosis L5	
	Yes	No
Yes	30	0
No	92	3

Sensitivity of X-ray with respect to MRI at L5 level was 24.59% and accuracy was also 26%

DISCUSSION:

The lumbar canal stenosis is a common disease now a days. The incidence has significantly increased in recent years due to the increase in life expectancy[11-13].

New criteria for radiological assessment of spinal canal assessment have been proposed, as well as areas and levels of measuring with introduce of new diagnostically methods into clinical practice.

Now a days MRI has become preferred modality for diagnosis of the spinal stenosis, due to its possibility to visualize Roentgen-negative soft tissues.

In our study, mean age of study population was 58.36±8.831 years.

The measurement of lumber canal diameter at L1 was 12.62±1.6 and at L2 level was 12.4±0.7.

The measurement of lumber canal diameter at L3, L4, L5 levels were 12±0.94, 12±0.91 and 11.7±0.99 respectively.

This is comparable to the study of Hughes A et al[14].
Hughes A et al[14] study proposing a new method of assessment the spinal canal narrowing degree, based on the anatomical aspects of the lumbar spinal stenosis and establishing its correlation with the clinical picture of the disease found 37 patients with of 62,4 years mean age (21 to 84): 14 men (37,8%) and 23 women (62,2%) showing L1 – L5 stenotic segments.

In the control group 37 randomly selected patients (volunteers) in mean age of 53,4 years old (29 to 67) without stenosis signs and narrowing of the spinal canal on the MRI imaging.

Rai GS et al[15] institution based prospective observational study assess the pattern and spectrum of MRI findings in various degenerative diseases reported out of total cases (n=100) forty-four patients (44%) had mild to severe degree of spinal canal stenosis.

Spinal canal stenosis was most commonly observed at L4/L5 and L5/S1 level.

Mild spinal canal stenosis observed in 26 cases, Moderate spinal canal stenosis observed in 13 cases & Severe spinal canal stenosis observed in 5 cases.

CONCLUSION

X-ray is a cost-effective, non-invasive imaging modality that is useful in cases of space occupying lesions and osteoporosis, but is not a diagnostic modality of choice in neurological/soft tissue related causes of low back ache.

MRI helps in better characterisation of most musculoskeletal diseases of the spine as compared to X-ray. MRI is a better and more informative imaging modality in evaluation of spinal canal stenosis.
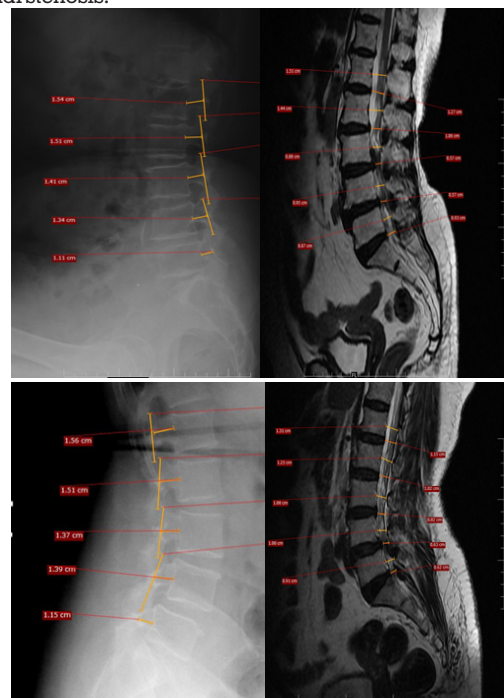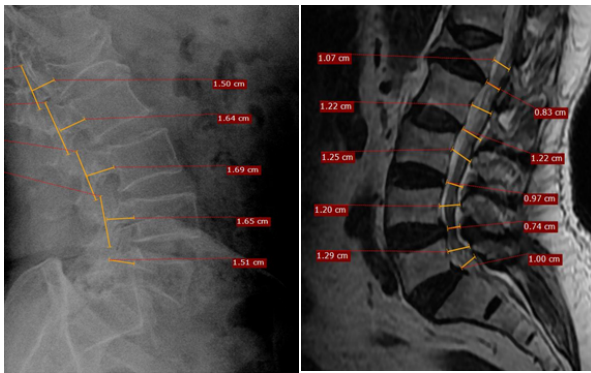
Figures 1,2,3: X-ray And Mri Corelation Of Lumbar Canal Stenosis At Different Levels

REFERENCES

1. Bolender NF, Schonstrom NS, Spengler DM. Role of computed tomography and myelography in the diagnosis of central spinal stenosis. J Bone Joint Surg Am. 1985, 67:240–246.
2. Chatha DS, Schweitzer ME. MRI criteria of developmental lumbar spinal stenosis revisited. Bull NYU Hosp Jt Dis. 2011, 69:303–307.
3. Cheung KM, Ruan D, Chan FL et al. Computed tomographic osteometry of Asian lumbar pedicles. Spine (Phila Pa 1976) 1994, 19:1495–1498
4. Fang D, Cheung KM, Ruan D et al. Computed tomographic osteometry of the Asian lumbar spine. J Spinal Disord. 1994, 7:307–316.
5. Hamanishi C, Matukura N, Fujita M et al. Cross-sectional area of the stenotic lumbar dural tube measured from the transverse views of magnetic resonance imaging. J Spinal Disord. 1994, 7:388–393.
6. Inui Y, Doita M, Ouchi K et al. Clinical and radiologic features of lumbar spinal stenosis and disc herniation with neuropathic bladder. Spine (Phila Pa 1976). 2004, 29:869–873.
7. Lee HM, Kim NH, Kim HJ et al. Morphometric study of the lumbar spinal canal in the Korean population. Spine (Phila Pa 1976) 1995, 20:1679–1684.
8. Singh K, Samartzis D, Vaccaro AR et al. Congenital lumbar spinal stenosis: a prospective, control-matched, cohort radiographic analysis. Spine J. 2005, 5:615–622.
9. Boden SD, Davis DO, Dina TS et al. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects. A prospective investigation. J Bone Joint Surg Am. 1990, 72:403–408.
10. Lee SU, Lee JI, Butts K et al. Changes in posterior lumbar disk contour abnormality with flexion-extension movement in subjects with low back pain and degenerative disk disease. PMR. 2009, 1:541–546.
11. Grenier N, Kressel HY, Schiebler ML et al. Normal and degenerative posterior spinal structures: MR imaging. Radiology; 1987.
12. Lee CK, Rauschning W, Glenn W. Lateral lumbar spinal canal stenosis: classification, pathologic anatomy and surgical decompression. Spine (Phila Pa 1976); 1988.
13. Strojnik T: Measurement of the lateral recess angle as a possible alternative for evaluation of the lateral recess stenosis on a CT scan. Wien Klin Wochenschr; 2001.
14. Hughes A, Makirov SK, Osadchiy V. Measuring spinal canal size in lumbar spinal stenosis: description of method and preliminary results. International Journal of Spine Surgery. Volume 9, Article 3,pp 1-9.
15. Rai GS, Mehra A, Gaur TNS. A prospective study of magnetic resonance imaging findings in patients of chronic low back pain: a clinico-radiological correlation. Int J Res Med Sci. 2016;4:47-56.