



ROLE OF MAGNETIC RESONANCE IMAGING IN EVALUATION OF LOWBACK PAIN

Radiodiagnosis

Dr. R. Sudheer

Associate Professor, Department of Radio diagnosis, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, Andhra Pradesh 534005.

Dr. Sriramaneni Venkateswara Rao*

Professor & HOD, Department of Radio diagnosis, Alluri Sitarama Raju Academy of Medical Sciences, Eluru – 534005, Andhra Pradesh, India *Corresponding Author

ABSTRACT

Low back pain is one of the most common presenting complaint encountered by physicians. Reaching to an accurate diagnosis and alleviating patient's pain is prime. Since degenerative changes and neoplastic lesion present initially with LBA, it is important to differentiate the lesions as degenerative, benign or malignant. Once the lesion is differentiated the patient can be managed appropriately.

Objective: To evaluate and narrow down the differential diagnosis of various spinal causes of low backache. To localize and characterize the spinal causes of low backache on MRI. Correlation of MRI findings with other available imaging modalities including clinical and surgical findings.

Material and Methods: A descriptive MR study was undertaken in 200 patients who presented with LBA to the department of Radiodiagnosis, Alluri Sitarama Raju Academy of Medical Sciences, Eluru. All the MRI scans in this study were performed using 1.5 T MRI scanner (SIEMENS MAGNETOM AVANTO).

Duration of study: The study was carried over a period of one year from January 2016 to January 2017.

KEYWORDS

LBA- Low backache, MRI- Magnetic resonance imaging

INTRODUCTION:

Low back pain that occurs in the lumbar and sacral area, is one of the most common presenting features in patients presenting to the outpatient department (1). Patients presenting with low backache or pain radiating into the lower extremities challenge a physician who desires a precise diagnosis for the etiology of the pain.

Acute LBA is a common presenting symptom in primary health care. Two thirds of the adult population suffers from LBA at some point of time in their lives (2). The prevalence of low back pain is as high as 70-85% (3). It is often self limiting in majority of the patients. The etiology cannot be ascertained in 95% of the patients, where the patient may have suffered a muscular or ligamentous injury (4,5). Extensive work up is warranted in cases where there is an association of acute backache with neurological symptoms to look for spinal stenosis, herniated intervertebral disc or cauda equina syndrome which accounts for a minority of the cases (5%). LBA can be categorized as: (i) non specific low back pain, (ii) LBA associated with radiculopathy, (iii) LBA with specific spinal cause which includes patients with neurological deficits or with serious underlying conditions like infections, tumours and patients not responding to therapy as in cases of ankylosing spondylitis or vertebral compression fractures (6).

Low backache can be as a result of spectrum of causes including orthopedic, surgical, gynaecological and neurological diseases. Although most of the low backache cases are attributed for postural abnormalities, in many it can be the result of lumbosacral spinal abnormalities. Hence this study is intended to focus on / deal with spinal causes of low backache.

Diagnostic imaging may provide the additional clinical information needed to rationally choose an appropriate treatment. The more precise the information provided by a diagnostic test, the more focused a therapeutic regimen can be. Imaging modalities available for Low backache- Radiograph, Myelography, Computed Tomography, MRI, Nuclear Medicine and Discography.

MRI produces superb delineation of soft tissue structures, excellent characterization of medullary bone, direct multi planar imaging and no radiation exposure. So it is considered by many to be the best imaging technique for the investigation of Low back pain (6). Thence for early and accurate identification of life threatening/major neurological problems such as tumor, infection, or major compression of spinal cord or cauda equina is evident and this is met very well with MR imaging. Because of exquisite delineation of cancellous bone and soft tissues, MRI is the optimal modality to detect the presence of any inflammatory process involving disc, vertebral body, or paravertebral soft tissue.

MRI is the preferred imaging modality for degenerative disc disease, intraspinal tumors, spinal infections, syringomyelia, cord infarction, multiple sclerosis and intramedullary tumors (7-10). Because it can noninvasively determine the exact position of the conus medullaris, MRI may be important when assessing the significance of post traumatic spinal deformities or planning surgery for fracture of the spine. When backache occurs secondary to retroperitoneal, pelvic, or other visceral source, the role of a negative MRI in ruling out musculoskeletal (spinal) etiologies may facilitate the diagnostic work-up.

Limitations of its use include high expense, regional variations for availability (rapidly becoming less of a problem), length of scan time, claustrophobia of patients (less problematic with new open MRI machines), and contraindications because of ferrous containing substances. High sensitivity for detecting asymptomatic pathology, although not a true limitation, is an important consideration in patient management.

Although there are limitations to its usefulness, some relative and absolute contraindications, and some pitfalls in the applications of results, MRI gives more specific and complete information about the anatomy and pathology of the lumbar spine than any other available diagnostic tool.

Considering MRI as the single best available investigative modality for diagnosing spinal lesions, this study will attempt to evaluate the various spinal causes of low backache and their characteristic features on MRI.

SELECTION OF PATIENTS:

Inclusion criteria:

All patients presenting with low backache with or without radiculopathy to orthopedic, neurology and neurosurgery departments.

Patients of all age groups and both sexes.

Exclusion criteria:

Patients presenting with low backache due to postural, intra abdominal and pelvic (visceral) causes (i.e., other than spinal causes).

Patients with cardiac pacemakers, ferromagnetic aneurysm clips, other ferromagnetic implants, intraocular metallic foreign bodies and patients with claustrophobia.

RESULTS:

Two hundred patients with low back pain were evaluated with MRI scan during the study period. Patients of all age groups and both sexes

were included. Out of 200 patients, 99 patients (49.5%) had degenerative disc disease at various levels of lumbosacral spine. Out of these 52 were males and 47 were females. This shows that there is no much difference in sex incidence.

40 cases (20%) showed traumatic lesions. Out of 40 cases, 35 cases were males and only 5 cases were females, indicating that males are most affected by trauma in this region (Road traffic accidents on highway).

22 cases (11%) showed changes of infective spondylodiscitis (pyogenic-10 cases and tubercular-12 cases) at various levels of lumbosacral spine. Out of these 15 cases were males and 7 cases were females.

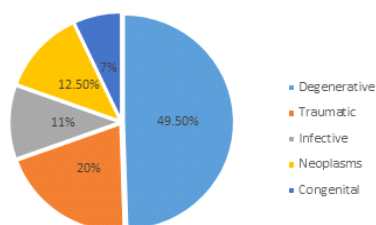
25 cases (12.5%) showed neoplastic lesions of spine. Out of these 14 cases are extradural lesions, 8 are intradural and extramedullary and only 3 cases are intramedullary.

14 cases (7%) showed congenital lesions of lumbosacral spine. Out of these, 5 were females and 9 patients were males. In this study, there is slight male predominance MRI findings with gender distribution is tabulated below:

TABLE 1: DISTRIBUTION OF SPINAL LESIONS.

Pathology	No. of males	No. of females	Total (%)
Degenerative	52	47	99(49.5%)
Traumatic	35	5	40(20%)
Infective lesions	15	7	22(11%)
Neoplastic lesions	16	9	25(12.5%)
Congenital lesions	9	5	14(07%)
Total	127	73	200(100%)

Distribution of spinal lesions



ILLUSTRATIVE IMAGES:

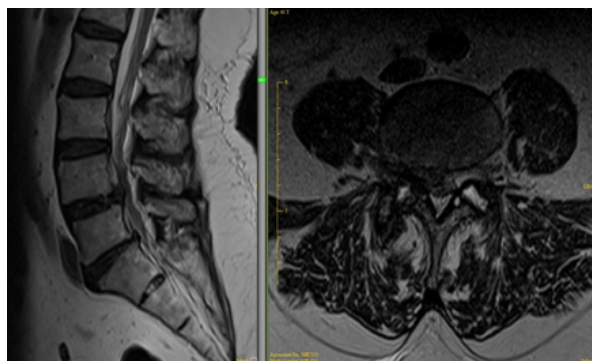


Fig .1: Sagittal and axial T2W imaging depicting desiccated disc with disc protrusion at L4-L5 level



Fig.2: Sagittal T2W imaging depicting Grade-I spondylolisthesis of L5 over S1 vertebra.

DISCUSSION:

MRI because of its non invasive nature, multi planar capability, and high inherent tissue contrast, MR imaging has proved to be sensitive and useful in evaluation of variety of spinal lesions in patients presenting with low backache in the present study.

This present study includes total 200 patients presenting with low backache, who are investigated by SIEMENS MAGNETOM AVANTO- 1.5 TESLA MRI scanner.

DEGENERATIVE DISEASES OF SPINE:

In present study , majority of patients with spinal complaints found to have degenerative disease of spine , followed by spinal trauma, spinal neoplasm, infective spondylodiscitis, and spinal congenital anomalies. Disc herniations are well demonstrated on MR imaging which are major components in contribution of spinal canal stenosis in present study. The most common type of disc herniations is disc protrusion, accounting for more than two third cases, followed by disc bulge, extrusion and sequestration in present study. Para central location of disc herniation is more common followed by central and foraminal disc herniations. MR imaging is more sensitive in detecting ligamentum flavum hypertrophy and facet hypertrophy in present study. These are more common in lower lumbar spine , attributing to lumbar bony spinal canal stenosis. Spondylolisthesis is most common at L4-L5, L5-S1 levels, followed by L3-L4 level.

SPINAL TRAUMA:

In evaluation of spinal trauma in present study, MR imaging permitted direct visualization of the morphology of injured spinal canal parenchyma and the relationship of surrounding structures to the spinal cord. Most common level of location of spinal trauma in present study is at L1 and L2 vertebral levels.

SPINAL INFECTIONS:

MR imaging is most sensitive radiological imaging modality for investigation of spinal infections, due to its high sensitivity and specificity in diagnosing and localizing infections of spine. In present study , MR imaging analysed and differentiated the most common types of spondylodiscitis- pyogenic and tubercular spondylodiscitis. Tubercular spondylodiscitis is more common than pyogenic spondylodiscitis in this region. Pyogenic spondylodiscitis is more common in age group of 50-70 years and rare below 30 years. On other hand tubercular spondylodiscitis is more common in younger age group. Paraspinal abscesses formation is most common in tubercular spondylodiscitis than pyogenic spondylodiscitis. Majority of patients with pyogenic spondylodiscitis showed insignificant paraspinal abscess formation. Tubercular spondylodiscitis involves multiple levels of spine where as pyogenic spondylodiscitis is seen to involve not more than two levels in present study.

SPINAL NEOPLASMS:

The present study insists MR imaging as the essential procedure of choice for the work up of all spinal tumors in the absence of contraindication to its use. Majority of spinal neoplastic lesions are extradural in location, followed by intradural extramedullary and intramedullary. Vertebral metastasis is the most common malignant spinal lesion in extradural compartment. Vertebral haemangiomas are the most common benign extradural neoplastic lesions in present study. Majority of intradural extramedullary lesions are nerve sheath tumors, accounting for 88-90% of total intradural extramedullary lesions. The most common intramedullary neoplastic lesions are ependymomas.

CONGENITAL SPINAL LESIONS:

In present study, transitional vertebrae are the most common congenital anomalies in patients presenting with low backache.

CONCLUSION:

In this study 200 patients with low backache were evaluated with MRI scan. A wide spectrum of various spinal lesions were found to be present in patients presenting with low backache, majority being degeneration disease of spine. MR imaging with its superb contrast sensitivity helped in getting clearer and more detailed images of spine by multiplanar and multiecho technique, aided in early diagnosis and evaluation of various lumbosacral spinal lesions.

MR imaging helped in differentiating and diagnosing broad range of spinal conditions as like congenital, degenerative, infective, traumatic and neoplastic lesions of lumbosacral spine. The correlation of MR

images with clinical, pathological, laboratory and surgical data has greatly improved the quality of interpretation and understanding of MR images. An understanding of the benefits and limitations of MRI in evaluating low back pain and improved communication between surgeons and radiologists, should allow for optimal management of the patient's clinical issues (11).

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