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# THE DIAGNOSTIC IMPORTANCE OF COMPRESSIVE MYELOPATHY BY MRI TECHNIQUE

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**ABSTRACT** Compressive Myelopathy is the term used to describe the spinal cord compression either from outside or within dural compartment of the cord itself.

**OBJECTIVES:**
1. To evaluate various causes of compressive myelopathy.
2. MR characterization of spinal cord compressive lesions.
3. To classify the lesions based on location into extradural/intradural compartments.

**MATERIALS AND METHODS:** A descriptive study of Role of Magnetic Resonance Imaging in evaluation of compressive myelopathy was done by taking a sample size of 50 patients, in the patients who were clinically suspected as a case of compressive myelopathy. Ethical committee approval with waved informed patient consent was obtained prior to data collection.

**CONCLUSION :** MRI is very definitive, sensitive, accurate, though costly but very specific, non invasive, radiation free modality for evaluation of Compressive myelopathy

**KEYWORDS :** CT - Computed Tomography, CSM – CervicaL Spondylotic Myelopathy, LF - Ligamentum flavum , MRI – magnetic resonance imaging

## INTRODUCTION:-

Compressive Myelopathy is the term used to describe the spinal cord compression either from outside or within dural compartment of the cord itself.

**Compression may be due to :**

1. Herniated disc
2. Post traumatic compression by fracture/displaced vertebra,
3. Epidural haemorrhage/abscess
4. Epidural / intradural (intramedullary and extramedullary) neoplasm.

Spinal cord injury is the major cause of quadriplegia and disability. Plain radiographs have a low sensitivity for identifying traumatic spinal lesions. Therefore trauma victims with plain films negative for spine injury but with a high clinical suspicion of injury or positive for spinal injury should undergo MR for a more definitive evaluation of the spine. MRI is the definitive modality in assessing spinal soft tissue injuries, especially in evaluation of spinal cord, intervertebral discs and ligaments. It also allows to differentiate spinal cord haemorrhage and oedema which may have prognostic value In case of spinal trauma, MRI demonstrates the relationship of fractured / subluxated vertebral bodies to the cord and highlights a significant stenosis. The signal abnormalities within this cord can be identified, helping to localize and define the degree of trauma.

Today, MR is considered the procedure of choice for the work-up of all spinal tumours. Many spinal cord diseases are reversible if recognized and treated at an early stage; thus they are among the most critical of neurologic emergencies. The efficient use of diagnostic procedures, guided by a knowledge of the anatomy and the clinical features of common spinal cord diseases, is required for a successful outcome.

The role of MRI is to distinguish compressive from non-compressive myelopathy. Once compressive lesions have been excluded, non-compressive cause of acute myelopathy that are intrinsic to the cord are considered primarily vascular, inflammatory and infectious etiologies.

## MATERIALS AND METHODS:-

A descriptive study of Role of Magnetic Resonance Imaging in evaluation of compressive myelopathy was done on 50 patients. The results were tabulated.

**Place of study:-** Department of Radiodiagnosis and imaging at Alluri Sitaramaraju Academy of Medical Sciences, Eluru, after taking prior clearance from ethical committee.

**Equipment:** HITACHI APERTO 0.4 TESLA permanent magnet. Version: VS.OE.Standard surface coils and body coils, were used for cervical, thoracic and Lumbar spine for acquisition of images.

**Sequences:** conventional spin echo sequences T1WI, T2WI, FLAIR Sag, STIR sag, T1WI, T2WI axial and GRE axial, and post contrast T1WI axial, Sag and coronal.

**Duration of study:-** The period of study was carried out from September 2011 to September 2013.

**Selection of patients:-**
**Inclusion criteria:** All age groups Both sexes All cases of compressive myelopathy
**Exclusion criteria:** Cases of non – compressive myelopathy. Degenerative disc herniation.

## RESULTS:-

In our study of 50 cases of compressive myelopathy we found various different causes for compression. Among these are trauma (22), infectious causes (12) primary neoplasms (08) and secondary neoplasm (08).

The age of the patient in our study ranged from 12-80 years with mean age of 42 years .

**Table 1 : Incidence among Males and Females**

| Age (years) | No of patients |
|---|---|
| 12 - 23 | **8** |
| 24 – 35 | **7** |
| 36 - 45 | **10** |
| 46-55 | **10** |
| 56 - 64 | **7** |
| 65 - 80 | **8** |

**Table 2 : Age wise distribution**

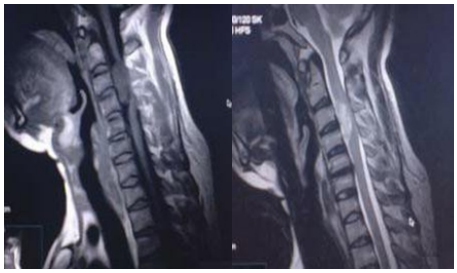
| Sex | No of Patients |
|---|---|
| Males | 34 |
| females | 16 |

**Table 3 : COMPARTMENTAL DIVISION OF VARIOUS CAUSES**

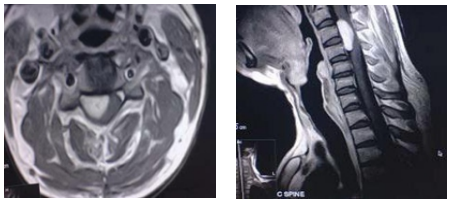
| CAUSES | NO OF PATIENTS (n=50) | EXTRADURAL (N=42) | INTRA DURAL EXTRA-MEDULLARY(n= |
|---|---|---|---|
| SPINAL INJURY | 22 (43.3%) | 22 (52.0% | 0 |
| INFECTIVE | 12 (23.3%) | 12 (28%) | 8 (100%) |
| PRIMARY NEOPLASMS | 8 (16.7%) | 0 | 0 |
| SECONDARY NEOPLASMS / METASTASES | 8 (16.7%) | 8 (20%) | 0 |
| TOTAL | 50 | 42 | 8 |

In extradural compartment out of total number of 42 patients, spinal injury is seen in 22 patients (52%), infective etiology in 12 patients(28%) and metastatic tumor deposit in 8 patients (16.7%). The pathology in intradural extramedullary compartment patients is seen in 8 patients (100%).

Spinal injury in cervical region is seen in 6 patients (27.2%) and 12 patients thoracic region (54.6%) {upper thoracic in 4 patients (18.2%) , Lower thoracic in 8 patients (36.4%) } and lumbar region in 4 patients (18.2%).



T1 SAG T2SAG



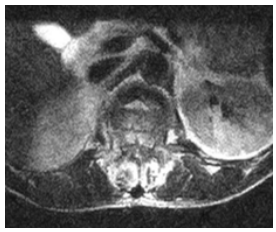
Axial Post Contrast SAG Post Contrast

Figure 1: T1, T2 Plain Sag, Post contrast Axial and Sag images showing Well defined enhancing lesion in intradural extramedullary region opposite to C3, C4 vertebral bodies causing compression on cord, suggestive of intradural extramedullary meningioma

T2 SAG

STIR SAG

T1 SAG



T2 AXIAL

**Figure 2:** T2, STIR, T1 Sag, T2 Axial pictures showing partial collapse of L1 vertebra with retropulsion of fracture fragment causing compression on conus medullaris with altered signal changes in cord suggestive of cord edema.

## DISCUSSION :

The ability of MRI to show the spine and spinal cord with greater sensitivity and specificity than myelography and CT is well established for trauma, neoplastic,congenital, & degenerative disorders.

MRI has become the modality of choice to image spine and spinal cord pathologies because of its ability to depict cross sectional anatomy in multiple planes without ionizing radiation, exquisitive soft tissue delineation and non invasiveness.

20 patients showed hypointensity on T1WI and hyperintensity on T2WI and STIR images suggestive of cord oedema. These signal changes are in consistent with studies done previously by *Hackney et al*.

MRI depicted not only the spinal cord changes in our patients but also the relationship of retropulsed fractured fragments of vertebral bodies to the cord (12 patients). posterior elements fracture (11patients), ligamentous disruption(11 patient), soft tissues injuries (11patients) and epidural haematomas (11 patients). The advantage of MRI in demonstrating all these changes is shown by similar to the study done by *Yamashita et al*[1], *Kulkarni et al*[9].

In our study, 12 cases of infective spondylitis were associated with compressive myelopathy. Nine cases were in the thoracic region two in the lumbar region and one in cervical region . X-ray showed some abnormality(like decreased disc space and wedge compression fracture) in 9 cases. MRI showed vertebral body destruction with pre and para vertebral collection in 9 cases. Epidural component compressing the cord was seen in all the 12 cases which was hypointense on T1WI, hyperintense on T2WI and STIR images suggestive of cord oedema. Cord oedema was associated with all the 12 cases. Study by *Roos DEA et al*[11] showed thoraco lumbar junction as the most common affected site as in our cases.

We used T1WI, T2WI and STIR sequence and post contrast to image spinal metastases. T1WI was useful in the detection of bone marrow metastases and STIR helped in picking up more marrow lesions.

In our study we had 2 patients with primary carcinoma bronchus, 2 patients had breast carcinoma, 1 renal cell carcinoma, 1 carcinoma prostate, and 2 patients with thyroid malignancy. We used T1WI, T2WI and STIR sequence and post contrast to image spinal metastases. T1WI was useful in the detection of bone marrow metastases and STIR helped in picking up more marrow lesions.

## Conclusion:

MRI is the definitive modality in assessing soft tissues of the spine and spinal cord abnormalities. It is the best modality to evaluate cord oedema/contusion and integrity of the intervertebral discs and ligaments. MRI is very sensitive and considered the imaging modality of choice to detect and characterize the spinal tumours and spinal infections.

In our study with the help of MRI, we could successfully characterize the spinal tumour based on location into Extradural / Intradural and assess the integrity of spinal cord, intervertebral discs and ligament after acute spinal trauma.

MRI is very definitive, sensitive, accurate, though costly but very specific, non invasive, radiation free modality for evaluation of Compressive myelopathy.

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