



## MRI Evaluation of Compressive Myelopathy

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### Abstract

**Background:** *Compressive myelopathy is the term used to describe the spinal cord compression either from outside or within the cord. The role of MRI is to distinguish compressive from noncompressive cause of myelopathy.*

**Material & Method:** *A cross sectional study of 60 patients with clinical history of compressive myelopathy are evaluated for various causes by 1.5 Tesla MRI scanner.*

**Result:** *Out of 60 cases of compressive myelopathy various different causes are trauma (26), Infection (14), Primary Neoplasm (10), Secondary Neoplasm (10).*

**Conclusion:** *MRI is very definitive, Sensitive, Accurate, Noninvasive, Radiation free modality for evaluation of compressive myelopathy.*

**Keyword:** *MRI, Compressive myelopathy, Primary Neoplasm, Secondary Neoplasm.*

### Introduction

Compressive myelopathy is the term used to describe the spinal cord compression either from outside or within the cord itself. Compression may be due to trauma, displaced vertebrae, epidural abscess, epidural hemorrhage, intradural and extradural neoplasm.

Spinal cord injury is the major cause of quadriplegia and disability. Plain Radiograph has a low sensitivity for identifying traumatic spinal lesion. In patients who have negative plain film for spinal injury but high clinical suspicion of

spinal injury should undergo MR for a more definitive evaluation of spine. MRI is a definite modality for assessing soft tissue injuries.

In case of suspected cord compression due to neoplasm, MRI serves as an excellent method for imaging tumour involving spinal column, canal and cord. Of all the areas of spinal pathology, It may be in the field of spinal tumour that MRI has had most impact.

Spinal tumour are categorized as extradural, intradural extra medullary, intra medullary.

Secondary tumour may arise from lungs carcinoma, breast carcinoma, lymphoma and renal cell carcinoma, maximum lesion are extradural in location.

Infectious etiology of spinal compression are mainly due to tubercular. Maximum infectious lesions are extra dural.

Many spinal cord diseases are reversible if recognized and treated in early stage.

### Material & Method

- The study was conducted in VIMSAR, Burla. We included 60 patients of both sex.
- The study was conducted from September 2017 to August 2019, 2 years.
- All the patients underwent MRI evaluation.

### Inclusion Criteria

- All age group > 10 yr, both sex, all cases of compressive myelopathy.

### Exclusion Criteria

- Cases of non-compressive myelopathy
- Degenerative disc herniation.

MRI evaluation is performed by GE 1.5 TESLA Electromagnet machine.

Whenever possible patients were followed up for histopathological diagnosis in case of neoplasm and outcome in case of spinal trauma

### Observation

All the patients with compressive myelopathy were subjected to MRI evaluation.

- MRI evaluate various cause of compressive myelopathy
- MRI used to classify the lesion based on location in to extra dural and intra dural
- MRI also evaluate age and sex distribution of various causes of compressive myelopathy

**Table 1:** Causes of Compressive myelopathy

MR diagnosis	Number of patients(n=60)	%
Traumatic Myelopathy	26	43.3
Infection/TB	14	23.3
Primary neoplasm	10	16.7
Secondary Neoplasm/Metastases	10	16.7

Most common cause for compressive myelopathy in our study was spinal trauma (43.3%) followed by spinal infection (23.3%).

**Table 2:** Level of Spinal Injury

Level of lesion	Number of patients(n=26)	%
C: Cervical	12	46.2
T: Thoracic	14	53.8
LT: Lower Thoracic	12	46.2
UT: UpperThoracic	2	7.7
TL: Thraco – Lumbar	0	0.0
L: Lumbar	4	15.4

Thoracic is the most common site of spinal injury.

**Table 3:** Infectious Causes of Compressive Myelopathy

Infection	No. of Patients (Total 14)
Tubercular	12
Pyogenic Epidural Abscess	1
Hypertrophic Pachymeningitis	1

Tuberculosis is the most common infectious cause of compressive myelopathy.

**Table 4:** Age, Gender & Compartmental Distribution of Various Causative factors according to the MRI Finding

Variables	MR diagnosis				P value
	Traumatic (n=26)	Infection (n=14)	Primary Neoplasm (n=10)	Secondary /Neoplasm metastases (n=10)	
<b>Age in Years</b>					
• 11-20	2 (7.0%)	2 (14.2%)	0 (0%)	0 (0%)	0.462
• 21-30	6 (23.0%)	2 (14.2%)	0 (0%)	0 (0%)	
• 31-40	6 (23.0%)	2 (14.2%)	2 (20%)	0 (0%)	
• 41-50	4 (15.3%)	2 (14.2%)	4 (40%)	2 (20%)	
• >50	8 (30.8%)	6 (42.9%)	4 (40%)	8 (80%)	
<b>Gender</b>					
• Male	22 (84.6%)	6 (42.9%)	4 (40%)	4 (40%)	0.110
• Female	4 (15.4%)	8 (57.1%)	6 (60%)	6 (60%)	
<b>Compartment</b>					
• Extradural	26 (100%)	14 (100%)	0 (0%)	10 (100%)	<0.001**
• Intradural	0 (0%)	0 (0%)	10 (100%)	0 (0%)	

**Table 5:** Characterisation of Traumatic Spinal Injuries by MRI

MRI finding	No. of patients (n=26)	%
1.Stable fractures	12	46.2
2.Unstable fractures	14	53.8
3.Posterior elements fracture	14	53.8
4.Ligamentous injury	14	53.8
5.Cord changes	24	92.3
6.Epidural hematoma/ soft tissue component	12	46.2
7.Pre and paravertebral collection	12	46.2

**Table 6:** Primary Tumour Classification

Primary neoplasms	No. of patients
Neurofibroma	04
Meningioma	06
<b>Total</b>	<b>10</b>

Meningioma is the most common cause of primary tumour causing compressive myelopathy.

**Table 7:** Location of Primary Tumour

Diagnosis	Cervical	Thoracic	Lumbar
Meningioma	0	4	2
Neurofibroma	2	2	0

Meningioma are more common in thoracic region where as neurofibroma are common in thoracic & cervical region.

**Table 8:** Site of Metastasis

Levels of lesions in Secondary neoplasm/metastases	Number of patients (n=10)	%
Cervical	2	20.0
Thoracic	8	80.0
Upper	4	40.0
Lower	4	40.0
Thoraco lumbar (T <sub>12</sub> -L <sub>1</sub> )	0	0.0
Lumbar	2	20.0

Thoracic region is the most common site of metastasis.

**Table 9:** Location of the Pathology

Compartment	Number of patients	%
Extradural	50	83.3
Intradural – Extramedullary	10	16.7
Total	60	100.0

Extradural compressive lesions (83.3%) are the most common cause for compressive myelopathy.



**Image 1:** T<sub>2</sub>Sag Intradural Extramedullary Neurofibroma



**Image 4:** T<sub>2</sub>Sag Sclerotic Metastasis - Carcinoma Prostate



**Image 2:** Post Contrast sag Meningioma



**Image 5:** Fracture Dislocation Causing Cord Edema Cord Compression



**Image 3:** T<sub>2</sub>Sag Tuberculosis of Spine with Cold Abscess

**Discussion**

A total of 60 patients referred were studied for compressive myelopathy using MRI in department of Radiodiagnosis, Veer Surendra Sai Institute of Medical Sciences and Research, Burla.

In our study 60 cases of compressive myelopathy we found different causes of compression. Among these are trauma (26), infectious cause (14), primary neoplasm (10), secondary neoplasm (10).

In traumatic cases level of injuries were thoracic (53.8%), cervical (46%), lumbar (15.4%) this comparable with study conducted by Kerslake et al<sup>1</sup>.

The age of patients in our study range from 12 to 70 year ,mean 42 year and 22 were male and 4 were female (male:female-11:2). This is in comparission with study done by Yamashita et al<sup>2</sup>. Among 26 cases of traumatic compressive myelopathy RTA (70%), fall from height (30%), which is similar to study conducted by Kulkarni et al<sup>3</sup>.

Among 26 patients 24 had cord changes and 2 had no changes.24 patiets showed hypointensity on T1WI, and hyperintensity on T2WI and FLAIR suggestive of cord edema and contusion .The signal changes are in consistence with study done previously by Hackney et al<sup>4</sup>.

In our study infectious causes of compressive myelopathy were (14). 12 cases were in thoracic region and 2 in lumbar region. Epidural component compressing the cord was seen in all the 14 cases. Study done by Roos DEA et al<sup>5</sup> showed thoracolumbar region is the most common affected site as in our study.

We had 10 cases of primary neoplasm, among which 4 were neurofibroma & 6 cases were meningioma. All the primary neoplasm were intradural extra medullary.

We had 10 cases of secondary neoplasm, out of which 6 patients (60%) showed more than 1 lesion,this is comparison to study done by Lien et al <sup>6</sup>.Among 10 patients, we had 3 patients with primary carcinoma bronchus,2 had breast carcinoma, 2 had lymphoma,1 had carcinoma of prostate , 1 had RCC &1 with unknown primary.

In our study compartmental distribution of pathology. Out of 60 patients, 50 showing extradural, 10 showing intradural extra medullary pathology.

### Conclusion

MRI 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 trauma. So in the end MRI is very definitive, sensitive, accurate, though costly but very specific, noninvasive, radiation free modality for evaluation of compressive myelopathy

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