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Clinico-Mri Correlation of Compressive Myelopathy (Retrospective Study)

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Abstract
The term "compressive myelopathy" encompasses a heterogeneous group of disorders like spondylotic myelopathy, cord compression secondary to tumor infections like tuberculosis, syphilis, etc., developmental anomalies like craniovertebral anomalies, syringomyelia and environmental causes like fluorosis. Localization of lesion whether intramedullary, extramedullary or root, cord or vertrebral column involvement is based on the history and clinical examination and in majority of cases it is accurate. It is always well to remind oneself that amongst the diseases of spinal cord, effective means of treatment is available to only a few diseases. In general Magnetic Resonance Imaging (MRI) has replaced all other investigations including CT scan. Early diagnosis and treatment gives remarkably good results spinal cord diseases. The present study is undertaken to know the clinical profile of cases of myelopathy and to correlate the clinical diagnosis with MRI diagnosis among the cases admitted in Government General Hospital, Kurnool during the period from 01-5-2012 to 30-4-2013.

Keywords: Cervial spondylosis, Flurosis, Myelopathy, Pott's spine, Spinal tumor

Aim of the Study
To study the clinical profile of cases of myelopathy and to correlate the clinical diagnosis with the MRI diagnosis.

Materials and Methods: Magnetic Resonance imaging was performed in 25 patients with various spinal cord and vertebral column lesions. The study group comprised 20 males and 5 females in the age group ranging between 20years and 80 years. In all patients data on history, clinical examination and clinical diagnosis were obtained. MRI was performed on a 0.35 tesla electromagnet. The primary pulse sequences included T1 and T2 weighted images. TI weighted images were obtained with a TR of 150 m sec and TE of 15 m sec. T2W were obtained with a TR of 4000 m sec and TE of 150 m sec spinal cord was imaged in sagittal and axial planes. On MRI, the location of lesion, its margins, signal intensity on both, T1 and T2 were noted.
The MRI morphology was correlated with clinical diagnosis.

a. Study involves humans only.
b. Type of study – Retro-prospective study.
c. Study population – All patients admitted in GGH, Kurnool during the study period (1-5-2012 to 30-4-2013).
d. Inclusion criteria: patients age group of 20-80 years.
e. Exclusion criteria : patients with seizures, cranial nerve involvement, abnormal higher mental functions, and children.

Study Period: 1-5-2012 to 30-4-2013.
Study Method
Complete data regarding history of patient, age, sex, occupation, habits will be collected. Complete physical examination and systemic examination will be done.
Routine investigations like blood sugar, hemoglobin, TC, DC, ESR, Blood urea, Serum creatinine, Chest X-ray, Xi-ray spine, MRI and relevant investigations will be done.

Materials and Methods

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Discussion

A total number of 25 cases were admitted seven medical units, Neurology and Neurosurgery of Government General Hospital, Kurnool during the year 2013 included in the study. Thorough clinical examination was made in all cases. Later all the patients were subjected to MRI apart from other investigations. Our present study is to correlate the clinical diagnosis with that of MRI diagnosis with respect to level of the lesion, location of the lesion and diagnosis. The study includes both male and female patients, of age groups from 20 years to 80 years. Spinal cord compression is caused by variety of conditions and it is forming 38.50% of cases of paraplegia as reported by various authors. Aetiological factors vary in different areas depending upon socio economic and environmental factors like fluorosis. In this study an attempt has been made to review 25 cases of spinal compression in light of accumulated literature. Stress has been laid on Clinico-MRI correlation of spinal compression[1]. The various details of 25 cases studies are shown in the following tables. Spinal cord compression due to fractures and fracture-dislocations are excluded from the present study.

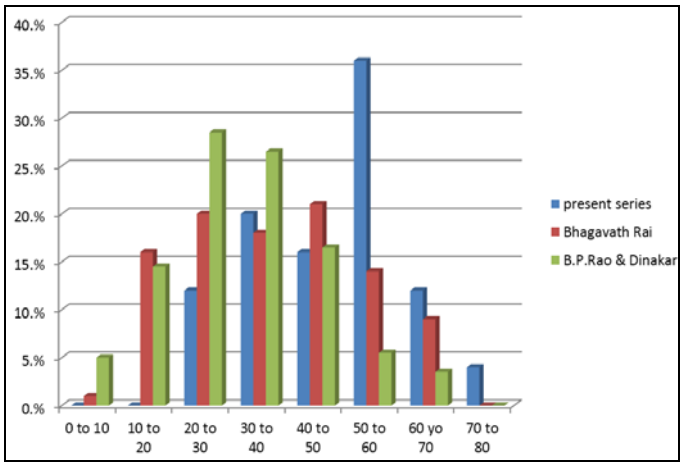
Age Incidence

In the present series, the patient's age ranged from 20 years to 80 years. The maximum incidence is in the third to sixth decade constituting 72% of cases. The incidence was reported by Chowdary *et al.* (60%) and by Bhargava and Berry[2] (68%). The age incidence is shown in the following table.

Table 1:

Age (years)	Male	Female	Total	Present series	Bhagwat Rai	B.P. Rao & I. Dinakar
0-10	0	0	0	0	03 (1%)	10(5%)
11-20	0	0	0	0	55(16%)	29 (14.5%)
21-30	1	2	3	12%	68 (20%)	57(28.5%)
31-40	5	0	5	20%	60(18%)	53(26.5%)
41-50	4	0	4	16%	69(21%)	33(16.5%)
51-60	6	3	9	36%	47(14%)	11(5.5%)
61-70	3	0	3	12%	30(9%)	7(3.5%)
71-80	1	0	1	4%	0	0
Total	20	5	25	100%	332	200

Chart 1 - Distribution of cases according to age



Sex Incidence

In the present series the total male to female ratio is 4:1 where as male to female ratio in Bhagawat Rai[3]& B.P.Rao & I.Dinakar was 3:1.

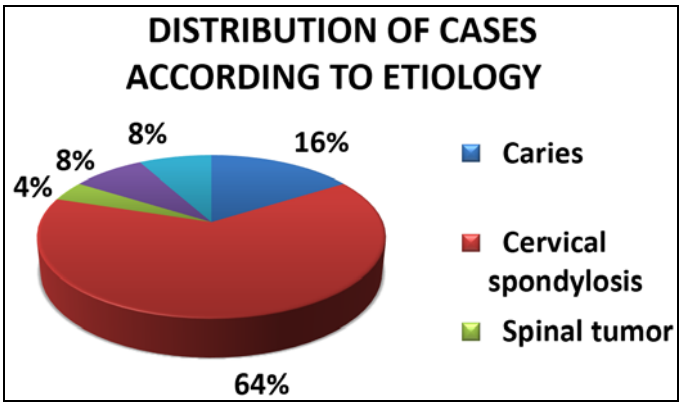
Table 2:

Author	Total	Male	Female	Ratio
Present series	25	20	5	4:1
Bhargwat Rai	332	225	77	3:1
B.P.Rao and I.Dinakar	200	151	49	3:1

In the present series, Cervical spondylosis is the commonest (64%) finding followed by Caries spine (16%).

Table 3: & Chart 2:

Etiology	No. of. cases	Percentage
Caries	4	16%
Cervical spondylosis	16	64%
Spinal tumor	1	4%
Fluorosis	2	8%
Others	2	8%
Total	25	100%



Location of Lesion

Lesions are common in thoracic spine as it is immobile column and receives maximum trauma. Distinctly they were more common in lower thoracic region. But in our series the lesions are more common in cervical nearly 76% of all cases (19/25). The comparision of incidence of level of lesion by various authors is given below-

Table 4:

Level	Present series	Elseberg (1925)	B.P. Rai & Dinakar (1970)	Bhagwat Rao (1971)
Cervical	19(76%)	32%	19%	30.8%
Thoracic	4(16%)	54%	49.5%	46.2%
Lumbar	2(8%)	14%	31%	25%
Multiple	0(0%)	0%	0%	0%

Clinical Features: Clinical features of spinal cord compression vary depending upon the sources of compression and the tracts involved in the spinal cord. The incidence of various symptoms and signs are shown in the following table highest number is with weakness of all 4 limbs.

Table 5:

Symptoms/signs	No. of patients	Percentage
1. Weakness of upper & lower limbs	18	72%
1. Weakness of lower limbs alone	6	24%
2. Weakness of one upper limb	1	4%
3. Loss of muscle mass	12	48%
4. Pains	20	80%
5. Tingling ?& numbness	21	84%
6. Bowel & bladder	6	24%
7. Difficulty in walking	24	96%

Quadriparesis	18cases
Paraparesis	6 cases
Brachial monoparesis	01 cases

Total	25 cases

Onset: The onset in the present series varied from 10 days to 2 years. Onset varied with the site of involvement and nature of etiology, onset was rapid within 10 days whenever there is associated precipitating factor like strain or minor trauma. The onset was acute in 3 cases.

Acute onset	03 cases	12%
Sub-acute & Chronic	22cases	88%

Most of the cases in the present series presented with difficulty in walking and weakness of lower limbs and upper limbs (18 cases), 6 cases only in lower limbs & weakness of Rt upper limb in one case. Pains present in 80% cases, tingling and numbness present in 84% cases. Flexor spasms present in 2 cases.

Mode of Presentation

A case of myelomalacia presented as flaccid quadriplegia. The onset is acute, one more case Pott's spine presented with flaccid paraplegia with acute onset. The remaining cases presented as quadriparesis with exaggerated reflexes accompanied by loss of one or more modalities of sensation. All of them are upper motor neuron lesions. In our seriesflexor spasms are observed in 2 cases. One case recorded as LMN type or cauda equine type of paralysis.

Twenty cases presented as radiculomyelitis. Most of the roots involved are C4, 5, 6. The pains increased with cough and straining. Spastic gait was present in almost all cases except in bed ridden cases where we could not test the gait. Motor power varied from grade 0 to grade 5 in our series. As for as nutrition is concerned, 6 cases presented with wasting of small muscles of hands. Spasticity was present in 21 cases and flaccidity present in 3 cases. No abnormal movements or fasciculations were seen.

Motor Power: Grading of motor power was done according to medical research council. In the present series grade '0' power was present in two cases grade 1-2 in three cases, grade 3 power in five cases, grade 4 power in fourteen cases, grade 5 in one case.

Nutrition: Loss of muscle mass was present in 11 cases, wasting of upper limb was present in 6 cases.

The following clinical abnormalities are present in my series.

Posterior column (PC), Pyramidal tract (PT), spinothalamic tract (STT) are involved in 20 cases.

Pyramidal tract & spinothalamic tract are involved in one case.

Pyramidal tract only involved in 4 cases.

The various types of modalities of sensation are lost either one or more in all most all cases except in 4 cases where only pyramidal tract is involved.

Table 6:

Long tract involvement	No. of cases
PT+PC+STT	20
PT+STT	1
PT	4

Aetiological and Pathological Aspects of Spinal Compression:

The incidence of spinal compression by various reports were not strictly comparable as some authors studied cases from neurosurgical centres excluding spondylosis, trauma while other included myopathies and degeneration of spinal cord.

Aetiological & Pathological patterns of various studies are shown in following

Table 7:

Aetiological factors	Bhargava & Berry 1961	Zolly *et al.* 1961	Chowdary 1968	B.P. Rao & Dinakar 1970	Bhagwat Rai 1971	Present series 2012
Caries spine	24.8%	28%	30.8%	16%	14.8%	4(16%)
Sp.Co.Tumors	12%	10%	14.1%	66%	25.9%	1 (4%)
Cervical spondylosis	6%	4.5%	2.6%	1%	12.39%	16 (64%)
Fluorosis	-	10%	2.6%	-	19	2 (8%)

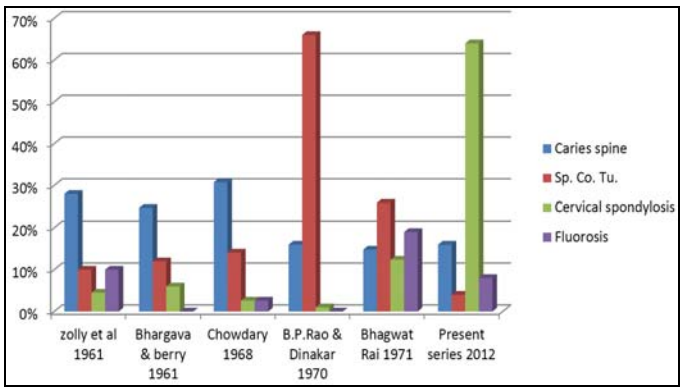


Chart 3: Etiological factors in various studies

In the present series the commonest cause of spinal compression is cervical spondylosis (16) cases 64% compared to other studies.

The second in frequency is caries spine followed by fluorosis which are common diseases in our region. Spinal cord tumors constituted only 4% compared to Dr.Dinakar series of (66%).

Routine investigations were done.

MRI was done in all cases and the findings are as follows (The findings are depicted in master chart): Vertebral changes, Disc space changes, Bony canal changes, Ligamentous changes, Thecal indentation, Pressure changes over spinal cord.

In case of cervical spondylosis there was decrease in height of vertebral body. There is bulging of intervertebral disc causing indentation of theca of cord. Dehydration of intervertebral discs is noted. Bulging of the disc material on the spinal cord has produced myelomalacia in some cases. Thickening of posterior longitudinal ligament is seen in some cases. Disc prolapse is commonly seen in 4, 5, 6th cervical vertebrae in 5 of 16 in our series. In four cases there is narrowing of neural foramina also. In a six cases degenerative end plate changes with osteophyte formation is present. All the above findings are better visualised in T2W images.

Of the 16 cases of cervical spondylosis MRI delineated the disc bulge, osteophytes, canal narrowing and myelomalacia. Only MRI consistently showed that changes in the spinal cord result from compression. They were best seen on T2 weighted images. The distribution is characteristic consisting of diffuse signal changes at the site of maximal compression and variable extension to the central cord as already enlightened by Mehali, TF. (1990)[4]. These changes were seen on T1W images only when damage is particularly severe and consisted of low signals suggesting poor prognosis. In our series three cases of dorsal vertebrae and one case of lumbar vertebrae were involved. Involvement of bodies, disc space, posteriorelements causing loss of height of vertebrae with severe cord compression with edema was noted. These were seen as hypointensity with T1W and hyperintensity with T2W imagesis observed in vertebrae due to destruction.

Two cases of Fluorosis, were noted in our study forming (8%). Radiologically thickening of posterior longitudinal ligament particularly between C2-C6 level in one case, there is narrowing of spinal cord dimensions compromising at C3-C4 level causing cord compressions with myelomalacia changes in second case. The cases came from endemic areas. Straightening of C-spine with degenerative end plate changes is noted in both cases. One case of neurofibroma was seen in my study. T2W images shows the mass present in extradural space impinging of spinal cord and extension into the neural foramina. No destruction of bone is notedIn present study, one case we found Syringomyelia. Spinal cord shows bulge at C3, C4, C5, C6, & C7 vertebral levels with central T1 hypointense and T2 hyperintense lesion which is suppressed on FLAIR images suggestive of Syringohydromyelia[5,6]. In the present series the MRI imaging of spine provided clear images, of vertebral body, intervertebral discs, spinal cord thecal sac and the lesions like herniation of discs, tumors, posterior elements. This gave a clear picture regarding the level of lesion, the likely pathology of vertebral body, intervetebral disc and spinal cord.

In all our cases, MRI study has given clear definitive diagnosis which correlated with clinical findings without a need for contrast myelography or biopsy. The clinical assessment of the levelof compression with MRI findings and the clinical assessment of the extradural condition are fairly in concurrence with the MRI findings.

Conclusions

1. MRI features of 25 patients with myelopathy of various compressive aetiology was studied.
2. The age group ranged from 20-65 years with 72% belonging to20-50 years age group with male predominance showing 4:1 ratio.
3. Of these 76% lesions were located in cervical region and the remaining in the dorsolumbar region.
4. The onset was acute in 3 cases (12%) sub acute and chronic in 22 cases (88%).
5. In our study cervical compression was in 18 cases (76%), thoracic 4cases (16%) and lumbar 2 cases (8%).
6. Pyramidal tracts are the commonest tracts involved in many cases
7. MRI features of 25 patients with myelopathy of various compressive aetiology was studied.
8. The most common cause encountered in our study was Cervical spondylosis (64%), Caries spine (16%) & followed by Flourosis (8%).
9. MRI could suggest the pathology of the lesion in all 25 cases.10.MRI could suggest the location of lesion and correlated well with clinical diagnosis.
10. Magnetic resonance imaging was found to be a highly useful in the evaluation of compressive lesions of spinal cord.

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