Etiological Spectrum of Non-traumatic Myelopathies: Experience from a Tertiary Care Centre

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Abstract
Aim: This study aimed to identify the clinical and radiological profile of non-traumatic myelopathies and various etiologies associated with them.

Material and Methods: Two hundred and four patients of non-traumatic myelopathy were prospectively studied in different wards of Sir Sundar Lal Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi, from September 2002 to March 2004. Patients underwent a detailed clinical evaluation followed by laboratory investigation and neuroimaging studies.

Results: Among 204 patients of non-traumatic myelopathy, 108 patients presented with paraplegia and 96 patients with quadriplegia. Tuberculosis was the commonest cause of compression paraplegia in this series and was observed in 42 cases (33.33%) while quadriplegia was seen in only 3 cases (2.38%). In the present study, acute transverse myelitis formed the major bulk of non-compressive myelopathy.

Conclusion: Tuberculosis of spine was the most common cause of compressive myelopathy and among the non-compressive group acute transverse myelitis and SACD were the important etiology.

INTRODUCTION
Quadriplegia and paraplegia due to non-traumatic myelopathy is a disabling and distressing neurological disease. The clinical presentation of spinal cord disease is diverse. Majority of studies on myelopathy from India have been carried out in the pre magnetic resonance imaging era. When diagnosis was done solely on basis of X-ray and myelography. However with the advent of MRI which is a very sensitive modality for spinal lesions, the yield for positive diagnosis has greatly increased which was not possible in the pre MRI era.

Present study aimed to identify the clinical and radiological profile of nontraumatic myelopathy and various etiologies in causation of quadriplegia and paraplegia.

MATERIAL AND METHODS
Two hundred four patients of non-traumatic myelopathy were prospectively studied in different wards (neurology, medicine, neurosurgery and orthopedics) of Sir Sundar Lal Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi, from September 2002 - March 2004. Patients were clinically evaluated and relevant routine biochemical analysis and appropriate neuroimaging studies were carried out in all. All cases with no obvious compression visible on MRI underwent further investigations which included serum HIV, VDRL, Mantoux, ESR, X-ray chest, collagen profile (ANA, RA factor, anti-dsDNA, LE cell phenomenon and antiphospholipid antibody), serum B12 and homocysteine levels, bone marrow, upper gastrointestinal endoscopy and intrinsic and antiparietal cell antibody. CSF examination was done to rule out secondary causes including OCB. Thirty two patients with spinal cord lesions suggestive of acute transverse myelitis (hyperintense spinal cord signal changes in T2-weighted images, extending over 3-4 vertebral segments and in central 2/3rd of spinal cord with a central dot) were subjected to visual evoked potential (VEP) study. Only 9 patients with spinal cord lesion suggestive of acute transverse myelitis have undergone MRI brain study. In cases of compressive etiology relevant investigations were done to rule out secondaries in spine and other causes.

RESULTS
Among 204 patients of non-traumatic myelopathy, 108 patients presented with paraplegia and 96 patients with quadriplegia. Age of presentation varied from 23 to 71 years with mean age of 43.2 years (±11.0) and median age of 42.5 years.
Among 204 cases, 126 cases were of compressive myelopathy and 78 cases of non-compressive myelopathy.

Various etiologies of compression myelopathy in our 126 patients included: tuberculosis 45 (35.71%), cervical spondylosis 43 (34.13%), tumors 25 (19.84%), CV anomalies 6 (4.76%), AV malformation 3 (2.38%), epidural abscess 2 (1.59%) and meningomyelocele 2 (1.59%) (Table 1).

In this study maximum incidence of tuberculosis of spine was found in 2nd and 3rd decade and disease was more common in males than in females. 53.33% of patients were male and 46.67% were female. Age of presentation varied from 14 to 71 years. Thirty five cases presented with asymmetrical progressive subacute paraparesis and seven cases with symmetrical progressive acute paraparesis.

The incidence of tubercular vertebral spondylitis involving thoracic, lumbar, cervical regions in our study were 80%, 13.33% and 6.67% respectively. Most frequently at least two vertebral bodies were involved in 67% of cases, in 30% three bodies were infected and in 3% skip lesions were encountered. T6 vertebra was most frequently involved in thoracic region.

Cervical spondylosis was the second most common cause of cord compression found in 43 cases (34.13%) leading to quadriparesis. All cases had radiological changes such as degenerative changes in cervical disc, osteophytes, reduced disc space and variable degree of cord compression on MRI. Out of this, 18 patients had multiple levels (from C3-C8). Commonest root involvement was C6. CV junction anomalies (Basilar impression with Klippel-Feil deformity with atlantoaxial dislocation found in 3 while 1 case had atlantoaxial dislocation along with occipitalisation of C1 vertebra and 2 case had atlantoaxial dislocation).

In the present study, acute transverse myelitis formed the major bulk of non-compressive myelopathy (35 out of 78 cases). Among 35 cases paraplegia was seen in 18 patients and quadriplegia in 17. 25 cases were males and 10 were females. Mean age of presentation was 28.45 (range 14-60) years. Fourteen cases had history of viral infection 1 week prior to development of neurological deficit. 11 cases had asymmetrical myelopathy and 3 cases had respiratory involvement requiring ventilatory support. MRI spinal cord was done in all cases of ATM. 31 patients had hyperintense lesion in T2-weighted images involving more than 2/3rd in axial section and multisegment (>2 vertebral segment) in longitudinal section were observed. Four cases had normal MRI of spinal cord. All patients who were diagnosed as ATM, only in 32 cases VEP was done and it was abnormal in 4 cases. MRI brain could be done only in 9 cases because of financial constraints, which revealed normal study.

In thirty cases clinical and investigation profile was suggestive of subacute combined degeneration. Male and female ratio was 1.5:1. Age of presentation varied from 23 to 71 years with mean age of 43.2 years (±11.0). There was no major difference in age of presentation in females and males. Eleven patients (36.67%) were pure vegetarian and 19 patients (63.33%) were occasional non vegetarian (< 5 times/month)

Myeloneuropathy was the most common type of presentation (65%) followed by myelopathy (25%), and dementia with myelopathy (10%) (Table 3). Duration of illness was between 1 to 14 months. Tingling paresthesias were the most common sensory symptom 55%, segmental sensory level from history was found in 1 case (3%) and band line sensation over trunk was found in 3 (9%) cases. One case had tingling sensation predominant in upper limb.

Majority of patients (45%) had serum B12 level between 100-200 pg/ml. Serum homocysteine level was <50 nmol/ml in 60% case. Antiparietal antibody was positive in 45% cases. T2 hyperintense signal were most commonly seen in posterior and lateral column of both cervical and thoracic region of cord. Inverted Y-shaped signal change in posterior part were seen in 9 cases.

Table 1 : Etiological profile of nontraumatic compressive myelopathy (n=126)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Quadriparesis</th>
<th>Paraparesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
</tr>
<tr>
<td>Potts vertebral osteomyelitis</td>
<td>3</td>
<td>2.38%</td>
</tr>
<tr>
<td>Potts with paravertebral abscess</td>
<td>26</td>
<td>20.63%</td>
</tr>
<tr>
<td>Tubercular arachnoiditis</td>
<td>6</td>
<td>4.76%</td>
</tr>
<tr>
<td>Benign neoplasm</td>
<td>1</td>
<td>0.79%</td>
</tr>
<tr>
<td>Malignant neoplasm (secondaries)</td>
<td>2</td>
<td>1.59%</td>
</tr>
<tr>
<td>Multiple myeloma</td>
<td>43</td>
<td>34.13%</td>
</tr>
<tr>
<td>Cervical spondylosis</td>
<td>6</td>
<td>4.76%</td>
</tr>
<tr>
<td>Cranio-vertebral junction anomalies</td>
<td>1</td>
<td>0.79%</td>
</tr>
<tr>
<td>Meningomyelocele</td>
<td>2</td>
<td>1.59%</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>49.21%</td>
</tr>
</tbody>
</table>


Cord atrophy in thoracic region (D3-D9) was seen in one case. Premature graying of hair with or without abnormal hair fall and brownish pigmentation mostly over knuckles, hand and face may be an early manifestation of B12 deficiency.

Rest of the conditions producing non-compressive myelopathies formed small percentage and included 3 cases of multiple sclerosis, 2 cases (2.56%) of Acute disseminated encephalomyelitis, 1 cases each of radiational and electrical myelopathy, 3 cases of HIV myelopathy, out of which 2 cases causing quadriaparesis and 1 case causing paraparesis and 3 were grouped as unclassified (Table 2). Among 3 cases who were diagnosed as multiple sclerosis by typical clinical history, neuro-imaging (MRI brain) was showing periventricular T2-weighted hyperintensity (>3 mm size and >4 in number) in 1 patient and in the remaining 2 cases VEP showed asymmetrical significantly prolonged latency. In these patients all the necessary secondary causes of demyelination was ruled out.

**DISCUSSION**

Quadriplegia and paraplegia are conditions with considerable morbidity having tremendous social repercussions. It is regarded as a disease of great and constant misery to the patient, family and the society.

It is estimated that involvement of the spine occurs in less than 1% of patients with tuberculosis. Tuberculosis was the commonest cause of compression paraplegia in this series and was observed in 42 cases (33.33%) while quadriplegia was seen in only 3 cases (2.38%). In two separate studies reported in Africa in 1994 and 1995 tuberculosis was the leading cause of paraplegia accounting for 29.69% cases and 47% cases. The involvement of lower thoracic spine (T7-T12) was seen in 14 cases (33.33%) while upper thoracic spine (T1-T6) in 28 cases (66.67%). This is in agreement with Hodgson et al. Rest of the studies showed Pott’s spine most common in lower dorsal region.

The second commonest cause of cord compression in our study was cervical Spondylosis. Its incidence was 34.13%.

3rd most common cause of cord compression was tumor. Its incidence in our study is 19.84% while in other studies its incidence varies from 21-30% of all compression. (Mani et al, Mehrotra et al, Chaudhary et al). In the present study, primary spinal cord tumors were (14.29%) while primary vertebral tumors and secondaries comprised of 2.38% and 3.97% respectively.

ATM is a monophasic illness and represents a localized form of post infectious encephalomyelitis. Overall incidence of ATM causing quadriaparesis and paraparesis was 17.16%. 17 cases (8.33%) were of quadriaparesis and 18 cases (8.82%) were of paraparesis. Antecedent event in the form of febrile illness was seen 40% of cases, which is consistent with finding in previous studies. Bakshi et al described ATM as a longitudinal myelitis involving multiple segments, whereas MS plaques are more focal and involve only 1-2 segments. In our series 31 patients had central, multisegment hyperintense lesion on T2 images except 4 had normal MRI spine.

Full-blown clinical picture of vitamin B12 deficiency consists of macrocytic anemia, atrophic glossitis, peripheral and central neurological disorders. One of the most prevalent manifestations is subacute combined degeneration (SACD) of the spinal cord. In a study of 143 patients of neurologic disorder due to vitamin B12 deficiency by Healton EB et al pernicious anemia was the most common underlying cause of cobalamin deficiency in their study. There is no literature showing commonest cause of B12 deficiency including this study probably dietary deficiency is an important cause for B12 deficiency in our country.

In the study by Healton EB et al (1991), paresthesias, most commonly described an tingling, pins and needles sensation or numbness were the most common initial

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**Table 2 : Etiological profile of non-compressive myelopathy (n=78)**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percentage</th>
<th>Number</th>
<th>Percentage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute transverse myelitis</td>
<td>17</td>
<td>21.79%</td>
<td>18</td>
<td>23.08%</td>
<td>44.87</td>
</tr>
<tr>
<td>SACD</td>
<td>11</td>
<td>14.10%</td>
<td>19</td>
<td>24.36%</td>
<td>38.46</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>1</td>
<td>1.28%</td>
<td>2</td>
<td>2.56%</td>
<td>3.85</td>
</tr>
<tr>
<td>ADEM</td>
<td>2</td>
<td>2.56%</td>
<td>0</td>
<td>0%</td>
<td>2.56</td>
</tr>
<tr>
<td>HIV myelopathy</td>
<td>2</td>
<td>2.56%</td>
<td>1</td>
<td>1.28%</td>
<td>2.56</td>
</tr>
<tr>
<td>Radiational myelopathy</td>
<td>1</td>
<td>1.28%</td>
<td>1</td>
<td>1.28%</td>
<td>1.28</td>
</tr>
<tr>
<td>Electrical</td>
<td>1</td>
<td>1.28%</td>
<td>3</td>
<td>3.85%</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>43.59%</td>
<td>44</td>
<td>56.41%</td>
<td>100</td>
</tr>
</tbody>
</table>

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**Table 3 : Clinical profile of SACD**

<table>
<thead>
<tr>
<th>Different types of presentation</th>
<th>No. of cases (%)</th>
<th>Duration of illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myeloneuropathy</td>
<td>19(65.0%)</td>
<td>1 month-12 month</td>
</tr>
<tr>
<td>Myelopathy</td>
<td>8 (25.0%)</td>
<td>1 month-4 month</td>
</tr>
<tr>
<td>Dementia + myelopathy</td>
<td>3 (10%)</td>
<td>8 month-7 year</td>
</tr>
</tbody>
</table>

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complaints and occurred in >70% of neurologic symptoms. Paresthesias were typically bilateral and were experienced in the feet or feet and hand. Our study is comparable with the finding of previous, except that we have founded 1 patient presented a segmental sensory level at mid trunk and 3 patients had history of band-like sensation which is a common feature in compressive myelopathy and uncommon in noncompressive myelopathy. Cause for the band-like sensation in subacute combined degeneration of cord due to B₁₂ deficiency is not known but probably it is due to affection of posterior column which is severe at the level of band-like sensation.

Corroborating findings by other investigators as well as ours indicate that hyperintense T2 lesions of the posterior column may be common in SCD, but are not present in every patient. What is uncommonly described in subacute combined degeneration of cord is cord atrophy. We found one case of cord atrophy in thoracic cord who presented as myeloneuropathy. We were not able to do serum methylmalonic acid, serum intrinsic factor antibody and folic acid.

Early suspicion and relevant investigations and early treatment are essential to prevent irreversible damage. Tuberculosis of spine was the most common cause of compressive myelopathy and among the noncompressive group acute transverse myelitis and SACD were important etiologies. This study brings out aetiologies like acute transverse myelitis, SACD, ADEM which are now better diagnosed, timely treated and prognosticated.

REFERENCES


Announcement

TOXOCON-2 : Second Annual Conference of IST National Snakebite Conference
24th-25th July 2006,
Venue: Amrita Institute of Medical Science, Cochin, Kerala
Open only for the members of the Indian Society of Toxicology
Fees: Rs.1200/-
Registrations will be accepted only after conference brochure is posted.
Tentative deadline: 15th June 2006
For further details : Poison Control Centre, Dept. of Analytical Toxicology, Amrita Institute of Medical Sciences, Cochin – 682026, Kerala.