Acute Non-Traumatic Paraparesis: A Comprehensive Analysis of Aetiology and Clinical Profile in an Indian Subpopulation

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Abstract: **Background and Objectives:** This study was performed in a tertiary care hospital in western India. Our aim was to understand and analyze the clinical profile and causes of acute non-traumatic paraparesis and correlate them with relevant biochemical and radiological investigations. **Methods:** 100 cases of acute non-traumatic paraparesis admitted over a period of three years were studied. Data on age, sex, presenting symptoms, clinical signs and medical investigations was analyzed critically. This study used the mean and the median as measures of central tendency and standard deviation as a measure of dispersion. **Results:** Incidence of acute non-traumatic paraparesis was found to be the highest in the third and fourth decade of life (36% of cases). Incidence among males (54%) and females (46%) was fairly equal. An inability to walk (72%) or a difficulty in walking (28%) were the chief presenting symptoms. 76% of cases presented in a stage of spinal shock. Tuberculosis was the commonest cause (40%), followed by acute transverse myelitis (26%). 50% of cases had compressive myelopathy while 30% had non-compressive myelopathy. Investigations such as cerebrospinal fluid (CSF) analysis, nerve conduction studies and Magnetic Resonance Imaging (MRI) were useful in diagnosing the causes. **Conclusion:** The commonest cause of acute non-traumatic paraparesis was tuberculosis. Early use of the MRI scan helps to confirm etiology and site of lesion. [Vaishnav B NJIRM 2014; 5(5):17-21]

Key Words: Tuberculosis, Acute Transverse Myelitis, Magnetic Resonance Imaging (MRI), Myelopathy

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Introduction: Acute onset paraparesis or weakness of both lower limbs affects not only the motor, sensory and autonomic functions but also has serious psychosocial sequelae. Very limited statistical data is available on the incidence and clinical profile of acute non-traumatic paraparesis in India. The present study was aimed at investigating the clinical profile and etiology of acute non-traumatic paraparesis. This condition is a diagnostic challenge since cases present with a variety of clinical features and etiologies.

Material and Methods: *Study Design:* 100 adult patients with a non-traumatic and acute onset (i.e., onset within 8 days of presentation) of paraparesis admitted over a period of three years in a tertiary care hospital located in a city in western India were evaluated clinically. Study started after approval from dissertation and scientific committee of the department of medicine at the institute. A detailed history was taken and a clinical examination was done in each case. Relevant biochemical and radiological investigations were also carried out. The cases were classified into those of compressive and those of non-compressive myelopathy based on MRI findings. Those cases having non-compressive myelopathy were put through nerve conduction studies, bone marrow examination, collagen profile, coagulation profile and tests for vitamin B12 level, Human Immunodeficiency Virus (HIV), and Venereal Disease Research Laboratory (VDRL). MRI / Computerized Tomography (CT) scan of the brain was carried out in cases that remained undiagnosed at the end of the investigations stated above. A CSF analysis was done for 88 patients to support the diagnosis. Typical CSF findings which were sought were CSF pleocytosis and albuminocytological dissociation.

Statistical Analysis Used: This study used the mean and the median as measures of central tendency and standard deviation as a measure of dispersion to characterize the population under study by age. Other than this, only simple percentages were used to categorize the population under study by various parameters.

Results: Out of the 100 patients, 54 were males and 46 were females, the M:F ratio being 1.17:1. The age of presentation varied, but the most commonly affected age groups were between 26

and 50 years (36%) and between 51 and 65 years (34%). The mean age was 45.66 years (with a standard deviation of 19.26) and the median age was 47.5 years. 18% of cases belonged to the age group of 12-25 years and 12% of cases belonged to the age group of more than 65 years. This showed that all age groups were affected by acute non-traumatic paraparesis.

Analysis by presenting symptoms showed 72% of cases with a complete inability to walk, 28% with difficulty walking, 58% with bladder-bowel involvement, 48% with radicular back pain, 38% with paraesthesia and 22% with associated fever. Only 4% of cases had an altered level of consciousness.

Further, 76% of cases presented with hypotonia, 12% with hypertonia and remaining 12% with normal tone in both lower limbs. 78% of cases had muscle power less than or equal to Grade 3 at all of the involved joints in both lower limbs. Thus, a majority of cases presented with significant motor weakness. 66% cases had either diminished or absent deep tendon reflexes (DTRs), 22% had brisk/exaggerated DTRs and 12% had normal DTRs. In most cases, a loss of joint position and sense of vibration (74%) were observed. 50% of cases had a sharp sensory level below which all modalities of sensation were lost. 22% cases had patch sensory loss and 28% had normal sensory system examination. The Babinski sign was positive in 62% cases.

CSF analysis was carried out in 88 cases of the 100. Amongst them, only 4.55% of cases had a turbid CSF, 50% had CSF pleocytosis, 72% had raised CSF protein levels and 7% had low CSF sugar levels (Table 1).

Table 1: Results of CSF Analysis by Various Common Causes of Acute Non-Traumatic Paraparesis

Series CSF		TB (n=38)*	ATM (n=26)	AIDP (n=16)
Appearance	Clear	34 (89.47%)	26 (100%)	16 (100%)
	Turbid	4 (10.53%)	0 (0%)	0 (0%)
Proteins (mg/dl)	Normal (15–50)	10 (26.32%)	10 (38.4%)	2 (12.5%)
	Raised (>50)	28 (73.68%)	16 (61.6%)	14 (87.5%)
	Decreased (<15)	0 (0%)	0 (0%)	0 (0%)
Sugar (mg/dl)	Normal (40–70)	24 (63.15%)	16 (61.6%)	12 (75%)
	Increased (>70)	8 (21.05%)	10 (38.4%)	4 (25%)
	Decreased (<40)	6 (15.8%)	0 (0%)	0 (0%)
Cells (/µL)	Normal (0–5)	10 (26.32%)	10 (38.4%)	12 (75%)
	Raised (5-10)	28 (73.68%)	16 (61.6%)	4 (25%)

* CSF was not sampled in 2 cases with tuberculosis because one of the patients had tuberculosis sacroileitis and the other patient did not give consent for lumbar puncture.

Only 22% cases had an abnormal X-ray of spine. Common abnormalities observed in the X-rays were vertebral wedging with or without destruction, degenerative spondylitic changes, paravertebral soft tissue opacity suggestive of developing abscess and osteoporotic changes.

An MRI of spine clinched the diagnosis in most cases and helped in confirming compressive lesions of the spinal cord. 50% cases had compressive myelopathy while 30% had non-compressive myelopathy as brought out by the MRIs. 10% cases had normal MRI of spine while the remaining 10% did not undergo an MRI as they were already diagnosed with the help of other investigations. Availability of MRI for cases in the present study was very important for diagnosis, as in similar studies carried out elsewhere and/or in earlier times, unavailability of MRI equipment or the patients' financial constraints led to a few patients remaining undiagnosed at the end of all other investigations.

Tuberculosis of the spine was the commonest cause of paraparesis among the cases included in the study (40%). The dorsal spine was most frequently affected by tuberculosis. The next commonest cause of acute non-traumatic paraparesis was acute transverse myelitis (26%), followed by acute inflammatory demyelinating polyradiculoneuropathy (AIDP) (16%). Other etiology included Space Occupying Lesion (SOL) of spine (8%), cerebrovascular accidents (CVA) (4%), multiple sclerosis (2%), non-traumatic prolapsed inter-vertebral disc due to severe osteoporosis (2%) and paravertebral hematoma secondary to bleeding disorders (2%). Refer Tables 2 and 3 for the supporting data.

Table 2: Etiological Distribution According To Age Group

Age Group	Tuberculosis		ATM		AIDP	
	N*	I*	N*	I*	N*	I*
12-25	6	15%	4	15.38%	2	12.5%
26-50	14	35%	12	46.15%	8	50%
51-65	12	30%	6	23.09%	4	25%
>= 65	8	20%	4	15.38%	2	12.5%
Total	40		26		16	

*N= Number, I=Incidence

Table 3: Etiological Distribution of the Population under Study

Sr. No.	Aetiology	Number (n=100)	Incidence
1	Tuberculosis	40	40%
2	ATM	26	26%
3	AIDP	16	16%
4	SOL(Primary / Secondary)	8	8%
5	CVA	4	4%
6	Multiple sclerosis	2	2%
7	PID + Osteoporosis	2	2%
8	Spinal hematoma	2	2%

In cases with non-compressive lesions as seen on their MRI spine, other investigations such as Electromyography and Nerve Conduction Velocity (EMG-NCV) studies, serum vitamin B12 level, VDRL test, collagen profile etc. were carried out. The EMG-NCV study was abnormal in 16% cases and was suggestive of AIDP.

Paraparesis and its sequelae have serious and lasting effects on an affected person's life. It also has tremendous psychosocial repercussions on the patient and his/her family. Therefore, rapid diagnosis and early treatment of acute non-traumatic paraparesis are crucial determinants of long term recovery and favourable prognosis of a patient. Thus, it becomes very important for the treating physician to be well-acquainted with various clinical presentations and diagnostic aids for paraparesis of non-traumatic origin.

The burden of tuberculosis is enormous in India. Approximately 1-2% of all tuberculosis patients have skeletal system involvement. The vertebral column is the most common site accounting for nearly 40% of all skeletal tuberculosis. Early diagnosis and treatment of tuberculosis of spine (Pott's paraplegia) is imperative for full recovery of a patient.[1, 2, 3]

In the present study, tuberculosis was the commonest cause of acute paraparesis (40%). This is similar to the findings of other studies, viz. 33.33%[4], 54%[5], and 44.4%.[6]

Pott's paraplegia occurred in all age groups and with equal incidence in males and females. The presentation could be either acute or sub-acute, i.e.: paraparesis can develop within a few days to a few weeks. Common symptoms among the cases included in this study were difficulty walking and back pain radiating to both lower limbs. It was the commonest cause of compressive myelopathy in the present study. A majority of the patients presented with hypotonia, loss of power, sharp sensory level, and diminished deep tendon reflexes indicating that they were in a stage of spinal shock. X-rays of spine were either normal or showed vertebral wedging/destruction, soft tissue shadows suggestive of abscess formation affecting two or more contiguous vertebral bodies.

Tuberculosis affects both the vertebral column and the spinal cord in the following ways: isolated vertebral body involvement (35% of cases in the present study); spinal cord involvement causing myelitis and arachnoiditis secondary to vertebral body infection (50%); tuberculous radiculomyelitis

as a downward extension of and complication of tuberculous meningitis (15%).

MRI is the investigation of choice for confirming the diagnosis and deciding the exact level of pathology.[7] Some of the common findings in MRI spine of patients with Pott's paraplegia were: wedging / fusion / sclerosis of vertebral bodies;[8] reduced Intervertebral disc space; clumping of nerve roots; paraspinal soft tissue shadows with necrosis due to paraspinal abscess;[8, 9] cord compression and oedema; arachnoiditis; and, hyper-intense lesions on T2W images of spine at multiple levels.

The next most common etiology of acute non-traumatic paraparesis in the present study was acute transverse myelitis (ATM) (26%). It was a major cause of non-compressive myelopathy. This finding is identical to the results of another study (13.1%).[6] A majority of the cases with ATM had primarily viral or post-infectious myelitis. This was confirmed by various biochemical investigations on CSF and blood. The remaining cases were diagnosed as idiopathic ATM.[10]

The male: female ratio in the study sample was 1.6: 1. The age group of 26-50 years displayed maximum incidence of ATM. Thus, young adult males were more commonly affected by ATM. Fever and an inability to walk was the most common presenting complaints. Bladder involvement occurred early in the course of the disease in all cases.[11] Back pain was conspicuously absent in all cases. Onset was acute and weakness occurred maximally at the onset. X-ray of spine was normal in all cases and the MRI showed spinal cord edema and hyper-intense T2W signals affecting a large part of the cord.[10, 11]

AIDP was the third most common cause of paraparesis in the study (16%). Males and females were affected equally. 50% of cases belonged to the age group 26-50 years. All cases displayed asymmetric motor weakness with areflexia and without bladder- bowel involvement. None of the patients had upper limb involvement at the time of presentation. The MRI of spine was either not done or was normal in all cases. Patients were diagnosed on the basis of: clinical presentation; neurological examination; albuminocytological dissociation in CSF study; acute demyelination with minimal axonal involvement and polyradiculoneuropathy on EMG-NCV studies.

Amongst the cases with SOL, four cases had extramedullary intradural cord compression. A differential diagnosis of neurofibroma, Schwannoma, and meningioma based on the MRI picture could be made. The remaining 4 cases had an extramedullary extradural cord compression due to vertebral body metastasis. MRI remains the gold standard for diagnosing primary as well as metastatic tumours of the spinal cord and vertebral column.[13] Common primary sites for such vertebral secondaries are malignancies of prostate, breast, colon and lungs.[14]

Bilateral frontal lobe infarcts, anterior cerebral artery thrombosis, anterior cerebral/ anterior communicating artery aneurysms can each present as paraparesis. It is almost always associated with urinary bladder involvement in the form of urgency, frequency and urge-incontinence.
2% cases had a spontaneous spinal hematoma.[15] One patient was a known case of hemophilia and had developed a paravertebral hematoma. The other patient was on anticoagulant drugs and had developed a spontaneous spinal epidural hematoma. Another study[16] brings out the risk factors of excess dosage of anticoagulant drugs and its correlation with spinal epidural hematoma in a larger population.

Of particular note is the absence of nutritional myelopathies and HIV myelopathy in the study which is in contrast to some of the other similar studies carried out in African countries. It may be in part due to selection and referral bias.

Some of the earlier studies carried out in India in the 1990s also showed results similar to the present study, viz. tuberculosis being the commonest cause of acute non-traumatic paraparesis. In developed countries too, there is a resurgence of tuberculosis as a cause of paraparesis especially in HIV-infected patients.[3] Patients presenting early and without spinal deformities respond well to medical treatment and corrective surgery can be avoided.[1,2,3] Despite strict

implementation of Directly Observed Treatment Strategy (DOTS) and the government's measures to curb the spread of tuberculosis by creating general awareness through patient education, tuberculosis continues to cause significant morbidity in Indian society. Tuberculosis is also one of the very few completely curable causes of acute paraparesis but only if diagnosed early.

Conclusion: Acute non-traumatic paraparesis is a neurological emergency. Reversible causes of acute paraplegia can be treated successfully if diagnosed early. It is important to diagnose and classify all cases into compressive and non-compressive lesions based on presenting symptoms because the management of the two differs. Tuberculosis still remains the leading cause of non-traumatic paraparesis in India. With early diagnosis of tuberculosis, it can be managed medically and surgical intervention can be avoided.

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