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Clinical Spectrum and Functional Outcome of Patients with Non-Compressive Myelopathy

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Abstract: ***Background: The discovery of antibodies against aquaporin-4 and evolving concepts of non-compressive myelopathies in the 21st century have made a major impact on the etiological profile of these diseases. Objective: To evaluate the clinical manifestations and etiological profile of patients with non-compressive myelopathy and study the functional status of patients with non-compressive myelopathy at presentation and after 3 months in a tertiary care hospital of Northeast India. Materials and methods: A Prospective observational study was carried out in the patients admitted to the Neurology ward and allied departments of Gauhati Medical college and hospital, Guwahati from November 2021 to February 2023. Patients of non-compressive myelopathy were included in the study. In addition to routine blood tests, chest X-ray, urinalysis, and visual evoked potentials, investigations included MRI of the brain and spinal cord, cerebrospinal fluid analysis, and immunological, infectious, and metabolic profile based on the pattern of involvement were done in this study. Results: Etiological diagnosis could be established in 78% of the cases, 20% of our cases were diagnosed to have idiopathic LETM, NMO was diagnosed in 28% cases, ATM in 26% cases, sAVM in 2% cases, hereditary spastic paraplegia (HSP) in 14% cases, Herpes Myelitis in 2% cases, Cryptococcal Myelitis in 2% cases, imaging negative myelitis (INM) in 2% cases and MS in 4% cases. On follow up based on mRS and Barthel index a total of 76% cases improved, 18% cases were static, 2% cases expired and 4% cases have been lost to follow up. There was a statistically significant difference in the Barthel Index and mRS scores between the groups who have and do not have bladder disturbance and quadriparesis at presentation and at 3 months follow-up as well. Conclusion: The commonest cause of non-compressive myelopathy was found to be NMOSD, followed by idiopathic LETM and acute transverse myelitis. Significant number of patients improved in their functional status at the end of 3 months.***

Keywords: Neuromyelitisoptica, noncompressive myelopathies, transverse myelitis

1. Introduction

Spinal cord diseases are termed as myelopathies, which can either be due to trauma or may be due to non-traumatic causes. Non-traumatic myelopathies are of two types: compressive myelopathies and non-compressive myelopathies[1].

Myelopathies usually present with motor and sensory deficits along with bladder and bowel disturbances. The clinical presentation and the causes of compressive myelopathies characteristically differ from those of non-compressive myelopathies, although rare presentations in either category can mimic each other and pose a diagnostic dilemma to the astute clinician. The common causes of spinal cord compression are Pott's spine, fractures, abscess, arterio-venous malformations, spondylotic changes, spinal instability, tumours, multiple myeloma and metastases. The non-compressive myelopathies have wide and diverse etiologies like infective, inflammatory, demyelinating, vascular, hereditary causes or can be due to toxic exposure, metabolic disorders or nutritional deficiencies[1].

The management strategies between compressive and non-compressive myelopathies differ dramatically, as compressive lesions usually require urgent neurosurgical intervention and spinal cord decompression, whereas non compressive myelopathies are usually amenable to medical treatment itself [2,3].

Non compressive myelopathies usually present with devastating neurological consequences like paraparesis/ quadriparesis, neurogenic bladder, decubitus ulcers, spasticity, etc which can impair the quality of life. The sequelae of non compressive myelopathies are diverse, with few diseases like sub-acute combined degeneration showing dramatic response to treatment, producing only a mild impact on the patient's daily life, whereas some cases of acute transverse myelitis can hamper the vital functions of mobility, sensation, bladder and bowel control, making the patient completely dependent on their caregivers[3].

The spectrum of non-compressive myelopathies can present as an acute onset illness, sub-acute course or as a chronic and progressive disease [1,3].

Limited information regarding the functional outcome of non-compressive myelopathies is available in the current literature, although the outcome of few specific myelopathies like acute transverse myelitis has been well described.

The study is being undertaken to evaluate the clinical manifestations and etiological profile of patients with non-compressive myelopathy and to study the functional status of patients with non-compressive myelopathy at presentation and after 3 months.

Objectives

1) To evaluate the clinical manifestations and etiological profile of patients with non-compressive myelopathy
2) To study the functional status of patients with non-compressive myelopathy at presentation and after 3 months

2. Materials and Methods

A Prospective observational study was carried out in the patients admitted to the Neurology ward and allied departments of Gauhati Medical College and Hospital, Guwahati from November 2021 to February 2023. Patients of non-compressive myelopathy were included in the study. In addition to routine blood tests, chest X-ray, urinalysis, and visual evoked potentials, investigations included MRI of the brain and spinal cord, cerebrospinal fluid analysis, and immunological, infectious, and metabolic profile based on the pattern of involvement were done in our study.

3. Results and Discussion

The study group comprised of 40% males and 60% females with a male to female ratio of 1:1.5. In 82% of the cases the presentation was acute and in 18% cases it was chronic. In 62% of cases the neurological deficits at presentation was paraparesis, in 36% of cases it was quadriparesis and 2% presented with monoparesis. In the study 34% of the total cases had a definite sensory level (DSL) on the trunk, whereas 66% cases did not have a DSL. Bladder involvement was present in 86% of the cases out of which 22% of the cases had urgency, incontinence was seen in 6%, retention was seen in 42%, hesitancy in 16% and14% of the total cases did not have bladder symptoms. The MRI was found to be normal in 6% [2] patients of hereditary spastic paraplegia (HSP) and 1 patient with imaging negative myelitis (INM)] of the cases and among the 94% cases who had shown changes on MRI, cervical cord lesions was seen in 8% cases, Cervico-dorsal in 22% cases, dorsal cord in 44% cases, dorso-lumbar in 12% cases, medulla and cervico-dorsal in 2% cases, C_4 to Conus in 2% cases, cervico medullary junction to dorsal Spine in 4% cases and in 6% cases MRI was normal. 48% of the patients had a longitudinally extensive transverse melitis (LETM). Associated neurologic deficits like optic neuritis was seen in 24% of cases, area postrema syndrome was present in 2% of cases whereas 74% cases did not have any associated neurological deficits.

Etiological diagnosis could be established in 78% of the cases, 20% of our cases were diagnosed to have idiopathic LETM, NMO was diagnosed in 28% cases, ATM in 26% cases, spinal arteriovenous malformations (sAVM) in 2% cases, HSP in 14% cases, herpes myelitis in 2% cases, cryptococcal myelitis in 2% cases, imaging negative myelitis (INM) in 2% cases and MS in 4% cases.

In our study at presentation the mean mRS was 4± 0.78 and the mean barthel index was 34.1±15.22. On follow up a total of 76% cases improved, 18% cases were static, 2% cases expired and 4% cases have been lost to follow up. There was a statistically significant difference in the Barthel Index and mRS scores between the groups who have and do not have bladder disturbance and quadriparesis at presentation and at 3 months follow-up as well. However no statistically significant difference in BI and mRS functional status scores after 3 months were noted in patients with LETM who had initially shown significance for functional status at presentation.

Table 1: Different Causes of Non-Compressive Myelopathy

Diagnosis	Number of Cases	% of cases
iLETM	10	20
NMO	14	28
ATM	13	26
sAVM	1	2
HSP	7	14
HERPES MYELITIS	1	2
CRYPTOCCALMYELITIS	1	2
INM	1	2
MS	2	4
TOTAL	50	100

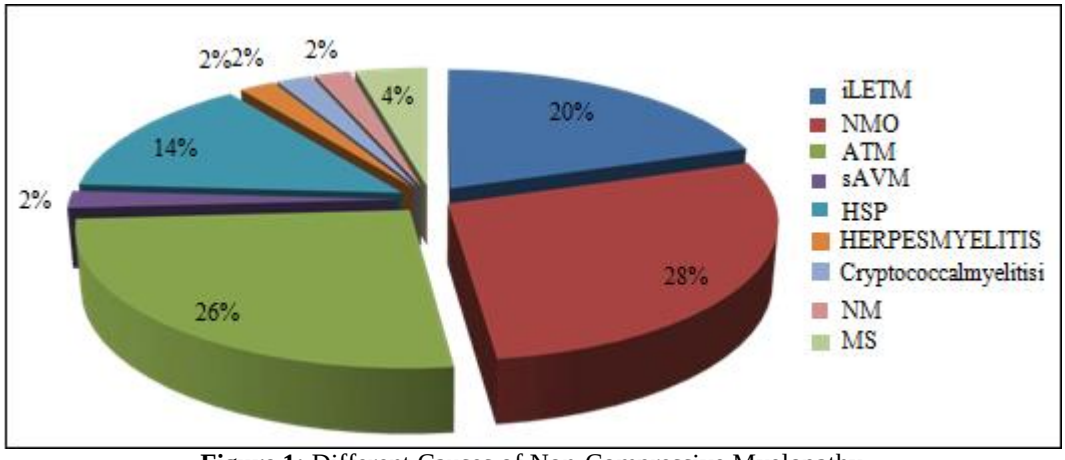

Figure 1: Different Causes of Non-Compressive Myelopathy

The above table and figure show that 20% of the cases were diagnosed to be iLETM, NMO was found to be the cause of NCM in 28% cases, ATM in 26% cases, sAVM in 2% cases, hereditary spastic paraplegia (HSP) in 14% cases, MS in 4% cases, Herpes Myelitis in 2% cases, Cryptococcal Myelitis in 2% cases, and Imaging negative myelitis (INM) in 2% cases.

Table 2: mRS score at admission

mRS score	Number of Cases	% of cases
1	0	0
2	1	2
3	12	24
4	23	46
5	14	28
Total	50	100

Table 2.1

Mean	4±0.78
Range	2–5

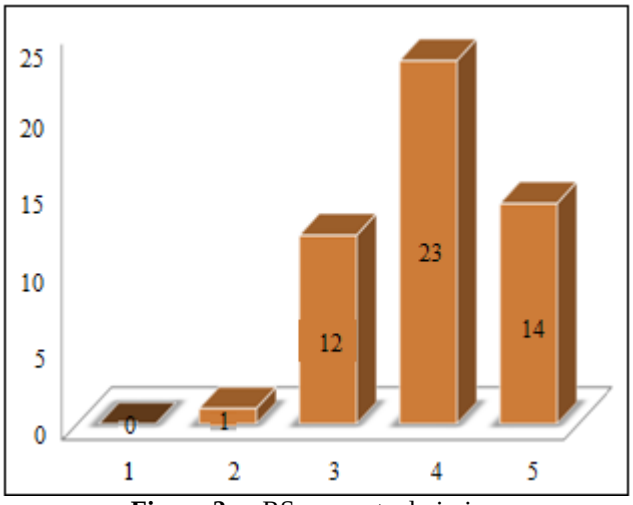

Figure 2: mRS score at admission

The functional mRS score at admission in the study showed that 2% of cases had mRS score of 2, 24% of cases had a score of 3, 46% of cases had a score of 4 and 28% of cases had a score of 5. The mean mRS of the study population was 4± 0.78.

Table 3: mRS score after 3 months

mRS	Number of Cases	% of cases
1	19	38
2	17	34
3	8	16
4	2	4
5	1	2
Death	1	2
Lost to follow Up	2	4
Total	50	100

Table 3.1: Mean mRS after 3 months

Mean	1.8±1.04
Range	1–5

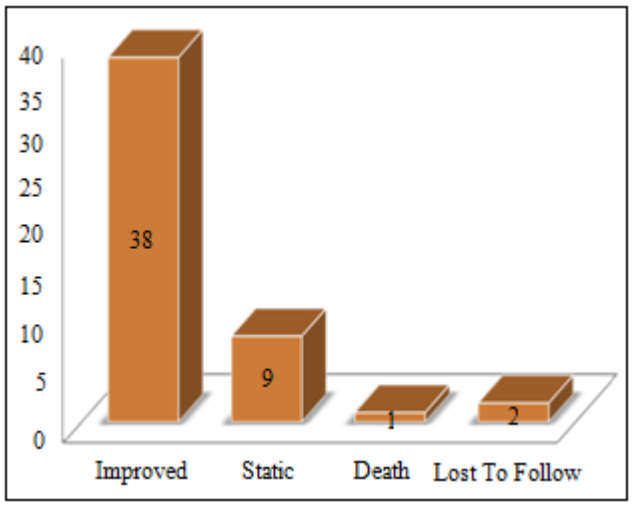

Figure 3: mRS after 3 months

On functional assessment after 3 months the mRS scores showed that 19 of the cases had a score of 1, 17 patients had a score of 2, 8 patients had a score of 3, 2 had a score of 4, 1 had a score of 5, 1 patient had expired and 2 patients were lost to follow up. The mean mRS after 3 months was 1.8± 1.04.

Table 4: Functional Outcome based on mRS Scores

mRS Outcome	Number of Cases	% of Cases
Improved	38	76
Static	9	18
Death	1	2
Lost to follow Up	2	4
Total	50	100

Figure 4: Functional Outcome Based on mRS Scores

The above table shows that the functional outcome based on mRS scores had improved in 38 cases, it was static in 9 cases, 1 patient had expired and 2 patients were lost to follow up.

Table 5: Barthel Index at admission

Barthel Index	At Admission	At 3 Months
Mean	34.1±15.22	56.8±19.2
Range	10–65	35-90

Table 5.1: Barthel Index at 3 Months

Mean	56.8 ± 19.12
Range	35 – 90

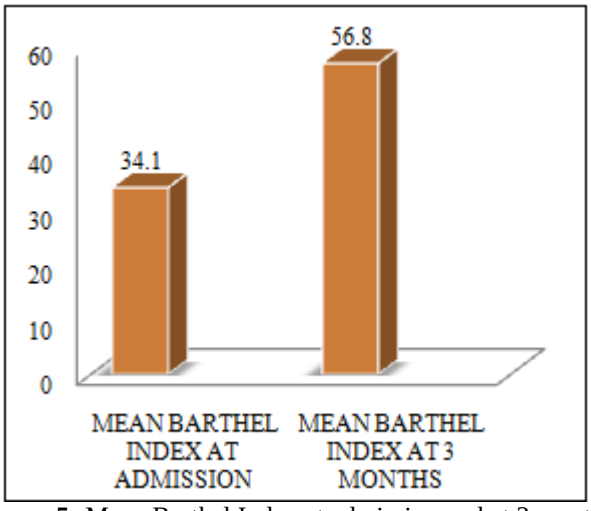

Figure 5: Mean Barthel Index at admission and at 3 months

It was observed that the mean barthel index of the study population at presentation was 34.1±15.22 and at 3 months follow up it was 56.8±19.12.

Table 6: Functional Outcome based on Barthelindex

Barthel Index Outcome	Number of Cases	% of Cases
Improved	38	76
Static	9	18
Death	1	2
Lost to follow up	2	4
Total	50	100

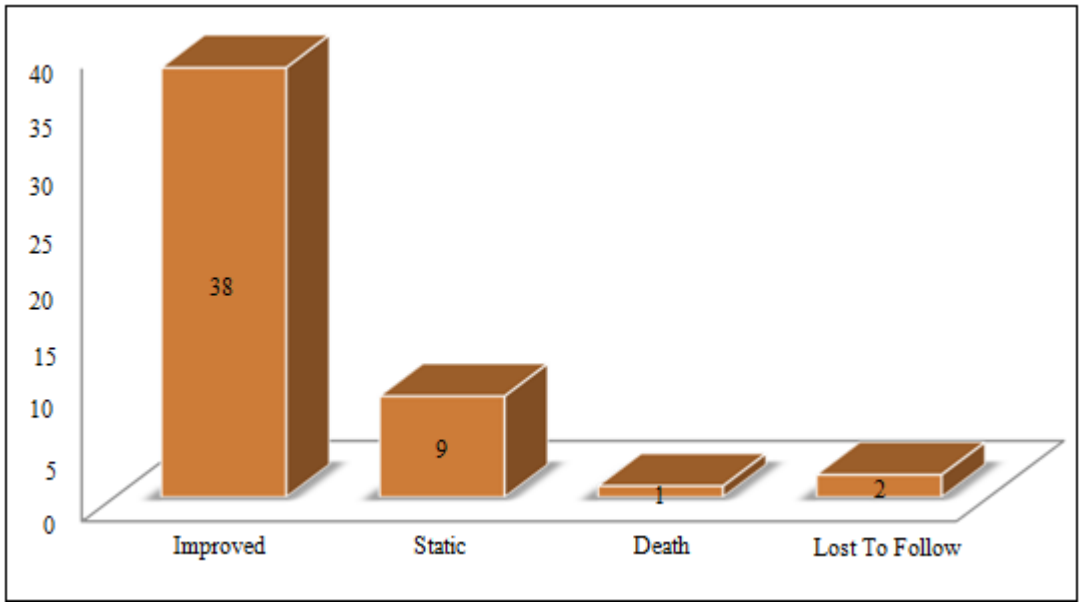

Figure 6: Functional Outcome Based on Barthel Index

The above table shows that a total of76%caseshad an improved outcome at 3 months according to Barthel Index scores, 18%cases have remained static, 2% cases had expired and 4% cases have been lost to follow up.

4. Conclusion

Numerous studies were done to evaluate the clinical spectrum of non- compressive myelopathies but limited information regarding the functional outcome of non-compressive myelopathies is available in the current literature, although the outcome of few specific myelopathies like acute transverse myelitis has been well described.

Findings in our study to evaluate the clinical manifestations and aetiological profile of non-compressive myelopathies largely confirm to thoseof other workers but since our study also assessed the functional status of patients with non-compressive myelopathy at presentation and after 3 months we can summarize and make the following conclusions-

1) The commonest cause of non-compressive myelopathy in our study was found to be NMOSD, followed by idiopathic LETM and acute transverse myelitis.
2) Thecommonest site of spinal cord involvement in MRI location was dorsal region followed by cervico-dorsal region.
3) Significant number of patients improved in their functional status at the end of 3 months.
4) At presentation quadriparesis and bladder symptoms showed significant association with the 3-month functional outcome, whereas LETM lesions on MRI showed significant association with the functional status at first presentation.

Non compressive myelopathies have broad and varied causes, the treatment and prognosis depends on the cause of the myelopathy.

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