Original Article

CLINICAL AND EPIDEMIOLOGICAL PROFILE OF PATIENTS PRESENTING WITH INFLAMMATORY MYELOPATHIES

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ABSTRACT

BACKGROUND

Inflammatory myelopathies, a group of disorders characterized by spinal cord inflammation, include conditions such as transverse myelitis (TM), neuromyelitis optica spectrum disorder (NMOSD), and multiple sclerosis (MS)-related myelitis. These disorders, driven by autoimmune, infectious, or post-infectious etiologies, present significant neurological challenges globally. Despite their impact, epidemiological data, particularly from resource-limited settings like Nepal, remain scarce, hindering effective diagnosis and management. This retrospective study aims to address this knowledge gap by examining the epidemiological, clinical, and outcome profiles of inflammatory myelopathies at a tertiary care center in Nepal.

METHODS

This single-center, retrospective cohort study was conducted at the Department of Neurology, Tribhuvan University Teaching Hospital (TUTH), Kathmandu, Nepal, from April 14, 2023, to November 16, 2024. It included 56 patients with confirmed inflammatory myelopathies, diagnosed based on clinical and radiological findings. Data were extracted from electronic medical records using a structured proforma, covering demographics, clinical features, treatment modalities, and functional outcomes assessed at presentation and three months post-discharge.

RESULTS

The study cohort had a mean age of 38.53 ± 15.96 years, with a female predominance (58.90%). NMOSD was the most common diagnosis (39.30%), followed by myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD) and infectious/para-infectious myelitis (16.10% each). Longitudinally extensive transverse myelitis (LETM) was observed in 64.30% of cases, with 76.80% showing cranial symptoms and 62.50% experiencing bladder involvement, 97% of which persisted at follow-up. Intravenous methylprednisolone was the primary acute treatment (96.40%), while 39.30% received rituximab for long-term immunosuppression. Functional independence improved from 42.85% at presentation to 75.5% at follow-up, indicating a positive treatment response.

CONCLUSIONS

This study provides the first comprehensive insight into inflammatory myelopathies in Nepal, highlighting a high prevalence of NMOSD and significant morbidity from persistent bladder symptoms. The findings underscore the efficacy of early immunotherapy, despite resource constraints limiting access to advanced treatments like plasma exchange.

KEY WORDS

Clinical; epidemiological; profile; inflammatory; myelopathies

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INTRODUCTION

Inflammatory myelopathies represent a diverse group of disorders characterized by inflammation of the spinal cord, collectively termed myelitis. These conditions encompass a spectrum of etiologies, including autoimmune, infectious, and post-infectious causes, with varying degrees of severity and prognosis. The term "myelitis" is broadly applied, with transverse myelitis (TM) being a common subtype where inflammation affects the entire cross-sectional area of the spinal cord, leading to significant neurological impairment [1]. Other notable conditions within this category include neuromyelitis optica spectrum disorder (NMOSD), multiple sclerosis (MS)-related myelitis, and secondary involvement from systemic autoimmune diseases such as systemic lupus erythematosus (SLE) or sarcoidosis [2]. The underlying pathophysiology often involves cell-mediated immune responses, antibody-mediated damage to central nervous system (CNS) antigens, or secondary CNS involvement due to systemic inflammation [3].

The exact global incidence of inflammatory myelopathies is not yet established in the literatures. Being the most common subtype, the epidemiology of transverse myelitis could reflect the global status. Studies show no gender preference and broad age coverage with incidence varying from 1.34 to 4.6 cases/million/year [4][5][6].

In resource-limited settings, such as Nepal, epidemiological data remain scarce, contributing to underdiagnosis and delayed management. The lack of comprehensive local data underscores the need for studies to better understand the disease burden and clinical patterns in such populations.

Clinically, inflammatory myelopathies present with a triad of symptoms: motor weakness, sensory disturbances, and autonomic dysfunction, including bladder and bowel incontinence. The onset is typically acute to subacute, evolving over hours to days, and may include paresthesia, pain, or spasticity [7]. Diagnostic evaluation relies on magnetic resonance imaging (MRI) of the spinal cord, cerebrospinal fluid (CSF) analysis for oligoclonal bands or infectious markers, and serological tests for autoantibodies (e.g., aquaporin-4 or myelin oligodendrocyte glycoprotein antibodies). The extent of spinal cord involvement, as seen on MRI, and the presence of associated systemic features guide the differential diagnosis.

Management of inflammatory myelopathies primarily involves high-dose intravenous corticosteroids (e.g., methylprednisolone) as the first-line treatment to reduce inflammation and hasten recovery [8]. In refractory cases or those with poor response, therapeutic options such as plasma exchange, cyclophosphamide, or rituximab may be considered, with evidence suggesting improved neurological outcomes in some patients [9]. Long-term management often includes immunosuppressive therapy to prevent relapses, particularly in autoimmune-mediated myelopathies. Prognosis varies widely, depending on the etiology, extent of cord damage, and timeliness of intervention, with some patients experiencing significant disability despite treatment.

This retrospective study aims to address the existing knowledge gap by exploring the epidemiological, clinical characteristics, and outcomes of patients with inflammatory myelopathies at a tertiary care center in Nepal. By analyzing the results on these aspects and follow-up data, this article seeks to provide insights into disease patterns, treatment responses, and outcomes in a resource-constrained setting, thereby contributing to improved awareness and management strategies among healthcare professionals.

METHODS

Study Design and Setting

This was a single-center, retrospective, cohort study conducted at the Department of Neurology, Tribhuvan University Teaching Hospital (TUTH), Maharajgunj, Kathmandu, Nepal. TUTH is a major tertiary referral center in Nepal, providing specialized neurological care and maintaining electronic medical records, which facilitated data collection. The study period spanned from 1st Baisakh 2080 to 1st Mangsir 2081 (April 14, 2023, to November 16, 2024).

Study Population

The study included all patients diagnosed with inflammatory myelopathies admitted to the Neuromedicine ward of TUTH during the study period. A non-probability convenience sampling method was employed to select cases. Treatment response was assessed at least three months post-discharge to evaluate outcomes.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Patients with a confirmed diagnosis of inflammatory myelopathies based on clinical and/or radiological findings.
- Patients admitted to the Neuromedicine Department of TUTH during the study period.

Exclusion Criteria:

- Patients with non-inflammatory myelopathies, such as those caused by compressive or traumatic etiologies.
- Patients with incomplete medical records or missing data critical to the study variables.
- Patients lost to follow-up for treatment response assessment.

Data Collection

Data were extracted from electronic discharge summaries maintained by the Department of Neurology. A structured study proforma was used to collect the following variables: age, gender, duration of illness, diagnosis, clinical features (including initial presentation, longitudinally extensive transverse myelitis, brain involvement, bladder involvement, and eye involvement), pre- and post-treatment disease severity based on whether patients had functional disability or not. Other variables included number of patients with persistent bladder symptoms, recurrence, acute treatment, maintenance therapy, and rituximab use. In cases of missing data, original patient files were retrieved from the hospital's record section, or patients were contacted via routine follow up in OPD or telephone to obtain the required information. Data collection was performed by trained personnel, with regular reviews to ensure accuracy and reliability.

Data Management and Statistical Analysis

Raw data were compiled and entered into a Microsoft Excel 2013 spreadsheet (Microsoft Corp, Redmond, WA, USA) for initial organization. Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp, Armonk, NY, USA). Descriptive statistics were used to summarize the data: continuous variables were presented as means and standard deviations, while categorical variables were expressed as frequencies and percentages. Inter-group differences for categorical data were evaluated using the Chi-square test, with a p-value of ≤0.05 considered statistically significant. Regression analysis was performed to adjust for confounders and to estimate the relationship between dependent (e.g., treatment outcomes) and independent variables (e.g., demographic and clinical characteristics).

Ethical Considerations

Ethical clearance was obtained from the Institutional Review Committee (IRC) of the Institute of Medicine (IOM), Tribhuvan University. As a retrospective study, no direct interaction with patients was required, and informed consent was not applicable. Patient confidentiality was maintained by anonymizing data during extraction and analysis. Only authorized personnel had access to the data, which were stored securely in compliance with ethical guidelines.

Quality Control

Data extraction was supervised by a professor of Neurology, to ensure consistency and accuracy. Regular reviews of abstracted data were conducted to minimize errors. Any discrepancies were resolved by cross-referencing with original records or through patient follow-up when feasible.

RESULTS

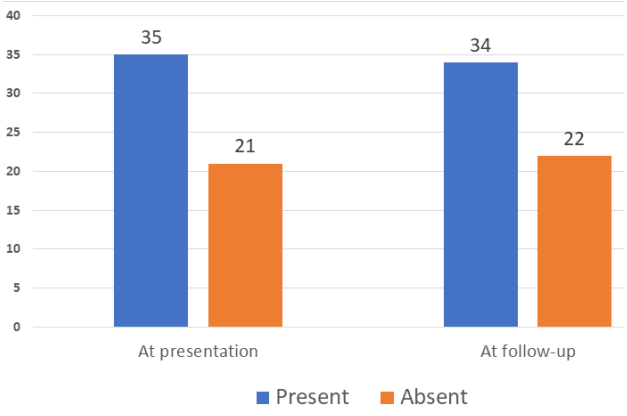
A total of 56 patients with inflammatory myelopathy were identified and included in the study. The mean age of the patients was 38.53 ± 15.96 years. Females (n=33, 58.90%) were the predominant group compared to males (n=23, 41.10%). The most common inflammatory myelopathy among our cohort was NMOSD (n=22, 39.30%), followed by MOGAD and infectious/para-infectious myelitis (n=9, 16.10%) (Table 1). The mean duration of onset of illness to presentation was 2 months.

Table 1: Frequency of different inflammatory myelopathies in our cohort

Diagnosis	Frequency (n)	Percentage (%)
NMOSD	22	39.30
MOGAD	9	16.10
Infectious/para-infectious myelitis	9	16.10
MS	8	14.30
Idiopathic	4	7.10
Autoimmune/sarcoidosis	3	5.40
ADEM	1	1.80%

Longitudinally extensive transverse myelitis (LETM) was present in 36 cases (64.30%). There were 43 patients (76.80%) presenting with cranial symptoms, and 35(62.50%) of the total patients showed bladder manifestations. Still, 34 patients had persistent bladder symptoms at follow-up. (Figure 1).

Figure 1: Comparison of the frequency of bladder symptoms at presentation and at follow-up



Disability was assessed using functional dependence of the patient. It was measured at presentation and after 3-month follow-up (Table 2). Only 49 patients could be assessed for follow-up measurement. At the presentation, there were 32 (57.41%) patients who were functionally dependent, whereas at follow-up, only 10 (20.40%) were functionally dependent. Seven cases (12.50%) presented with features suggestive of optic neuritis.

Table 2: Assessment of the functionality of the patients at presentation and at the 3-month follow-up period

Functionality of the patient	At presentation (n=56)	At follow-up (n=49)
Functionally independent	24 (42.85%)	37 (75.5%)
Functionally dependent	32 (57.41%)	10 (20.40%)
mortality	0	2 (4.08%)

Intravenous methylprednisolone (n=54, 96.40%) was the mainstay of treatment in the acute setting. One patient received oral steroids. Low-volume plasma exchange was used in six patients (10.70%) as a rescue therapy in comparison to three patients using full volume plasma exchange. (Table 3).

Table 3: Rescue therapy used in treatment

Treatment option	Frequency	Percentage
Methylprednisolone	47	83.90%
Low-volume plasma exchange	6	10.70%
Full volume plasma exchange	3	5.40%

There were 22 patients (39.30%) receiving rituximab as the long-term immunosuppression therapy, whereas 21 (37.50%) received only steroids (Table 4). A single patient was receiving short-course steroids. One patient was not on any maintenance therapy, and the other one continued the ART/ATT course as maintenance.

Table 4: Maintenance immunosuppression therapy

Treatment option	Frequency	Percentage
Rituximab	22	39.30%
Steroid only	21	37.50%
Azathioprine	5	9.10%
Short course steroid	4	7.20%
Mycophenolate	1	1.80%
Cyclophosphamide	1	1.80%

DISCUSSION

Understanding the local disease pattern, distribution, clinical features and treatment response is of utmost importance in the holistic management of any disease. Our observational study provides an interesting face of inflammatory myelopathy in a tertiary center. We characterized 56 patients with inflammatory myelopathy in terms of clinical and epidemiological profiles. This study is the first of its kind performed in Nepal. The findings contribute to address the research gap on these disabling neurological conditions in the Nepalese context.

The mean age of participants was 38.50 years, which is in line with the findings of an India-based study by Pandit et al. They reported the mean age to be 35.40 years in idiopathic inflammatory demyelinating disorders of central nervous system [10]. The female preponderance in our study is supported by global and regional data which reported that autoimmune disorders are more likely to occur in young females. Entities like NMOSD, and MOGAD show higher prevalence among women in third to fourth decade [11]. The plausible explanation is the role of hormonal and genetic factors in immune modulation [12]. Compared to inflammatory myelopathy, non-inflammatory are more likely to occur in older male [13].

We found NMOSD to be more common than multiple sclerosis. Studies conducted in various parts of India and other Asian counterparts also found NMOSD cases to be more compared to MS cases [14] MS is more common in temporal climate and some studies have shown its association to Vitamin D deficiency [15].

We found nine cases of MOGAD in our setting. MOGAD has been recognized as a separate entity in recent years, and our findings reinforce its significant, though still underreported, presence in Nepal. Longitudinally extensive transverse myelitis (LETM) is a hallmark for NMSOD, although may present in other inflammatory myelopathies. LETM was reported in 44% of the NMOSD cases by Nayak et al. We found its prevalence to be 64.30% among all cases. This reinforces the role of neuroimaging in diagnosis of such disorders [16].

Bladder dysfunction (urgency or retention) is the most debilitating sequelae of any inflammatory myelopathies. It contributes significantly to the poor quality of life. Bladder involvement was common in our cohort (n=35), with a larger proportion (n=34) still experiencing persistent bladder symptoms at follow-up, highlighting significant morbidity.

Some subtypes of inflammatory myelopathies are not limited to spinal cords. They can have cranial manifestations. Cranial symptoms were noted upto 76.80% of our cohort. Optic neuritis was observed in 12.50% of patients. This rate is somewhat lower than expected in NMOSD, and MOGAD cohort. Optic neuritis can be a initial manifestation of MS. Isolated ON in adult can have 50% conversion rate to MS [17].

ON is more common in NMOSD and MOGAD than in MS. It can be the initial symptom of NMO in about 60% cases (40-50% as ophthalmological symptoms alone or 10-20% in

association with myelitis) [18].

Given the high frequency of inflammatory myelopathies, any patient with suspected myelitis after ruling out infectious myelitis and spinal AVF, an empiric trial of immunotherapy can be given. It can be both diagnostic and therapeutic. Intravenous methylprednisolone (IVMP) is the preferred option considering its easy accessibility and low risk profile [19].

Almost 97% of patients were started on IVMP in our study. Six patients received low-volume plasma exchange, and three underwent full-volume exchange. Although full-volume plasma exchange was offered to all patients, high cost was the major factor in the reluctance to use of this treatment modality. A study by Shrestha et al done at our center, investigated the role of low-volume plasma exchange in immune-mediated neurological disorders. They found significant improvement in functional score (mRS) at discharge for immune mediated neurological disorders affecting NMJ and peripheral nerve. This data reflects the reality of treatment in resource-limited settings where sometimes treatment is guided by financial and logistic aspects of patients rather than guidelines and recommendations [20].

Some subtypes can show a relapsing course, particularly NMOSD and MS, so a long-term immunosuppression is required. Some patients in MOGAD subtypes can have monophasic course thus long-term therapy might not be needed [21].

As a maintenance therapy, 39.30% were on rituximab, another 37.50% were continued on steroid alone, likely due to financial and logistic limitations in accessing biologics.

Functionality of the patients was assessed on the basis of whether the patient was functionally dependent or not before and after the treatment. There was a good increment of functionally independent patients (from 42.85% at presentation to 75.5% at follow up) which suggested the positive impact of the treatment. Similarly, the number of functionally dependent patients reduced considerably (from 57.41% at presentation to 20.40%) at follow up which further suggested good impact of the treatment. Early diagnosis and treatment with immunotherapy significantly reduce neurological disability. The goal of any treatment is to address the functional ability of the patient in performing daily activities through improving available joint range of motion and relieving pain. [22].

Up to two-thirds of patients with acute transverse myelitis may be left with significant sensory deficits and bladder involvement. For a proper recovery, both pharmacotherapy including immunomodulation and the rehabilitation strategy is a must [23].

Despite a favourable outcome, persistent bladder symptoms could affect the quality of life in such patients. Access to immunotherapy like plasma exchange and rituximab needs to expanded and inpatient rehabilitation services should be prioritized for proper recovery including urologic care.

This study is one of the few comprehensive studies on inflammatory myelopathy in Nepal. A single-center design, a small sample size, and some patients' loss to follow-up are among the drawbacks. Nonetheless, these results offer a crucial starting point for further study and policy formulation.

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