

# Distinguishing Devic's neuromyelitis optica from multiple sclerosis: a case report.

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## ABSTRACT

Devic's Neuromyelitis Optica (NMO) is an idiopathic, inflammatory, demyelinating disease specific to the spinal cord and optic nerves resulting in acute, severe myelitis and optic neuritis. Unlike "typical" Multiple Sclerosis (MS), the brain is characteristically spared and spinal cord involvement spans at least three vertebral segments. NMO is often misdiagnosed as MS; however, recent research has identified distinguishing pathophysiologic, clinical, neuroimaging, and autoantibody criteria favoring a distinct disease. *Case:* A 53 year-old-female of West Indies decent with a history of normal pressure hydrocephalus, status post ventriculoperitoneal shunt placement, and MS diagnosed in 2003 presented to the emergency room with bilateral lower limb weakness, blurred vision, and urinary urgency. At presentation, the bilateral lower limbs were with flaccid paralysis. Lower limb sensation was decreased to light touch, pinprick, and proprioception. Visual acuity was 20/200 in both eyes and Babinski reflexes were upgoing bilaterally. Cervical and thoracic MRI revealed increased signal intensity extending from C5 to T4 and T9 through T1 (figure 1). MRI of the brain failed to demonstrate any MS pathology. EMG and NCS were unremarkable. CSF serology was positive for NMO-IgG, a recently discovered autoantibody specific for NMO. After receiving high dose intravenous steroids and intravenous immunoglobulin therapy she was transferred to acute inpatient rehabilitation where azathioprine was initiated. Clean intermittent catheterization was required for the patient's neurogenic bladder. Baclofen and Neurontin were started to treat developing spasticity and neuropathic pain. The patient advanced to wheelchair independence; however, there was no motor return. Vision improved significantly to 20/50 bilaterally. *Discussion:* NMO is a rare, yet likely underdiagnosed clinical entity, distinct from MS in its pathogenesis, presentation, and fulminant course. Early diagnosis is essential as NMO affords a poorer prognosis in comparison to MS, particularly if untreated, with high incidences of permanent paraplegia, blindness, and respiratory failure.

## CASE DESCRIPTION

A 53 year-old-female with a history of normal pressure hydrocephalus and MS diagnosed in 2003 presented to the emergency department at Temple University Hospital with a two day history of bilateral lower limb weakness progressing to flaccid paralysis along with severe, paroxysmal tonic muscle spasms, decreased visual acuity, and urinary urgency. Examination revealed flaccid paraplegia, absent muscle stretch reflexes, upgoing Babinski reflexes, and decreased sensation to light touch, pinprick, and vibration throughout the bilateral lower extremities. Upper extremity strength, sensation, and reflexes were intact. Cranial nerves were uninvolved except for a visual acuity of 20/200 O.U. *Imaging:* MRI of the brain was without active disease or MS pathology.<sup>1</sup> MRI of the cervical and thoracic spine demonstrated increased T2 signal, cord expansion, and enhancement extending from C5 to T11 spinal cord levels (figure 1). EMG and NCS were unremarkable. *Laboratory:* CSF studies demonstrated a pleocytosis along with elevated IgG and myelin basic protein. CSF was positive for NMO-IgG antibody serology performed by Mayo Laboratories.<sup>4</sup> Complete rheumatologic work-up was negative. *Course:* The patient failed to make significant neurologic recovery during her rehabilitation admission despite aggressive treatment with Azothioprine and corticosteroids. Seated balance and trunk stability improved along with visual acuity and the patient advanced to a modified level of independence with wheelchair mobility. She mastered intermittent catheterization and was fully independent with bladder management by discharge.

### Neuromyelitis Optica

### Multiple Sclerosis

Optic nerves and spinal cord only	Any white matter tract
Severe attacks	Milder attacks
Respiratory failure in 30% secondary to cervical myelitis	Rare respiratory failure
MRI brain normal or non-specific	MRI brain with multiple periventricular white-matter lesions
MRI cord with longitudinally extensive, central necrotic lesions	MRI cord with multiple small peripheral lesions
CSF oligoclonal bands usually absent	CSF oligoclonal bands usually present
80-90% female	60-70% female
Frequent coexistent autoimmune disease (30%)	Rare coexistent autoimmune disease
T cells, B cells and macrophages; prominent necrosis; eosinophilic and neutrophilic infiltrate prominent; marked complement activation	T cells, B cells and macrophages; variable degree of necrosis; neutrophilic infiltrate rare; complement activation less marked

Table 1. Comparison of neuromyelitis optica and multiple sclerosis.<sup>3</sup>

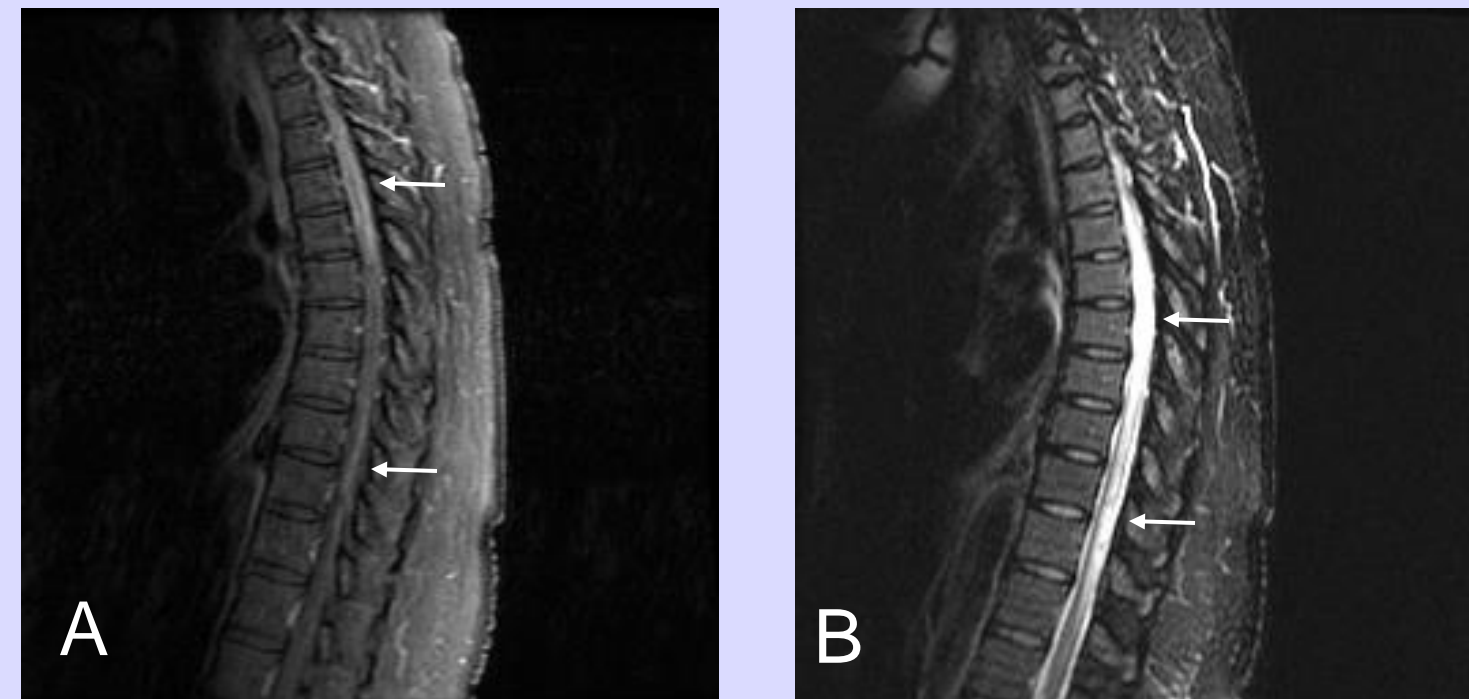


Figure 1. Cervical and Thoracic Spine MRI. (A) T1-weighted, gadolinium enhanced image showing diffuse enhancement extending from C5 through T4 and T9 through T11. (B) T2-weighted image showing a longitudinal area of hyperintensity and spinal cord thickening from C5 to T1.

### Criteria of Wingerchuck et al. for diagnosis of NMO

- ABSOLUTE CRITERIA:**
- Optic Neuritis
  - Acute Myelitis
  - No evidence of clinical disease outside of the optic nerve or spinal cord
- SUPPORTIVE CRITERIA: (Major)**
- Negative brain MRI at onset
  - Spinal cord MRI with signal abnormality over >2 vertebral segments
  - CSF pleocytosis of >50 WBC/mm<sup>3</sup> or >5 neutrophils/mm<sup>3</sup>
- SUPPORTIVE CRITERIA: (Minor)**
- Bilateral optic neuritis
  - Severe optic neuritis with fixed visual acuity less than 20/200 in one eye
  - Severe, fixed, attack-related weakness in one or more limbs

Table 2. Proposed diagnostic criteria. All three absolute criteria and one major or two minor supportive criteria required for diagnosis of NMO.<sup>2</sup>

## DISCUSSION

NMO is a severe, idiopathic, inflammatory, demyelinating disease characterized by the co-occurrence of optic neuritis and myelitis without pathologic or imaging evidence of brain involvement. Although many patients with relapsing-remitting NMO satisfy diagnostic criteria for MS, NMO is distinct in its relative cerebral sparing and prominent longitudinal, gadolinium-enhancing central spinal cord lesions (figure 1). Pathologically, NMO is distinguished from MS by its characteristic necrotic foci within the spinal cord gray matter and along the optic nerves. Unlike MS, CSF typically demonstrates a relative pleocytosis with >50 WBC/mm<sup>3</sup> along with elevated protein and a paucity of oligoclonal IgG bands (figure 2). Recent development of a serologic NMO-IgG autoantibody marker that localizes to the blood-brain barrier should provide a sensitive and specific diagnostic tool to justify early and aggressive pharmacologic treatment.<sup>4</sup>

NMO constitutes less than 1% of all demyelinating disease in Western countries; however, the incidence may be as high as 7.6% in Asian and African populations. Due to its relatively low incidence and variable clinical presentation, NMO is often misdiagnosed as MS. Early diagnosis and treatment of NMO is critical as prognosis, rehabilitation, and pharmacologic management differs between these two syndromes. NMO carries a poor prognosis with high incidences of permanent paralysis, binocular blindness, and respiratory failure. Within five years of symptoms, 50% of patients lose functional vision in at least one eye or require assistance with ambulation and 32% will develop respiratory failure.<sup>2</sup> Rehabilitation of NMO is, in essence, rehabilitation of a spinal cord injury and should prepare patients for the possibility of lifelong para or tetraplegia due to the often necrotic nature of spinal cord lesions. Current pharmacologic treatment of NMO consists of intensive immunosuppressive drugs (azothioprine, cyclophosphamide, mitoxantrone, corticosteroids) with little role for MS immunomodulatory drugs. Unfortunately, there are no well controlled, prospective trials comparing efficacy of various drug treatments.

## CONCLUSION

We present a characteristic case of NMO presenting with fulminant, severe paraplegia, binocular visual impairment, urinary incontinence and severe paroxysmal tonic muscle spasms. Like many cases of NMO, this patient was initially misdiagnosed with MS early in her disease course. Although this patient met criteria for NMO based on clinical examination and neuroimaging studies, diagnosis was confirmed using a recent serum autoantibody marker first described in 2004 by Lennon et al. at the Mayo Clinic.<sup>4</sup> It is important that physiatrists recognize the distinct signs and symptoms of NMO in order to permit early and proper diagnosis, rehabilitation, and pharmacologic treatment.

## REFERENCES

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