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Case Report

Abducens Nerve Palsy as a Presenting Symptom of Multiple Sclerosis

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Abstract

Multiple sclerosis (MS) is a chronic disorder characterized by demyelination of the central nervous system. It often presents in women aged 18-35 with neurological symptoms such as visual loss, paresthesia, focal weakness, and ataxia. Demyelination in the brainstem can result in internuclear ophthalmoplegia causing binocular horizontal diplopia. Our report details a patient with horizontal diplopia from an isolated abducens (sixth) nerve palsy as the initial symptom of MS. While rare, this demonstrates the importance of including MS in the differential diagnosis for an isolated abducens nerve palsy, especially in younger patients with no known vascular risk factors.
Keywords: Abducens nerve palsy, multiple sclerosis, demyelination, diplopia

Introduction

Multiple sclerosis (MS) is a chronic neurodegenerative disorder caused by destruction and sclerosis of myelin sheath, a protective structure that surrounds nerve fibers in the central nervous system (CNS).[1] Historically, MS was diagnosed when patients had multiple lesions disseminated in time and place and has been treated with corticosteroids during a relapse.[2] Symptoms can be pronounced or subtle, potentially evading medical attention and varying from person to person and throughout the disease course.

Symptoms may include visual loss, limb numbness and/or weakness, loss of coordination, tingling, sexual dysfunction, fatigue, speech difficulties, bowel and bladder dysfunction, or muscle tightness.[1] The disease usually presents between ages 18 and 35, and more commonly in women.[1] The diagnosis of MS has become more specific, utilizing magnetic resonance imaging (MRI) to detect damage around nerve fibers, which is an early sign (T2 lesions).[1] Treatment can be initiated at the first sign of inflammation.[1] However, MS is typically diagnosed in the presence of two or more clinical attacks with two or more CNS lesions at the same or different times.[2] The mainstay of therapy during an acute relapse is an immunosuppressant such as corticosteroids to suppress inflammation of myelin sheath.[1]

MS can result in multiple neuro-ophthalmic manifestations. Optic neuritis is a common initial presentation of MS and typically presents with episodic blurred vision or loss of vision preceded by retrobulbar pain that is worsened by eye movements.[3] Lesions in the brainstem can result in diplopia from internuclear ophthalmoplegia, "one-and-a-half syndrome," or from involvement of fascicles or nuclei of the oculomotor, trochlear, and/or abducens nerves. These symptoms commonly

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appear in association with other symptoms, but can also occur in isolation as a relapse in patients with known MS.[3] Isolated abducens palsy as the initial neuro-ophthalmic manifestation of MS is rare, occurring in approximately 0.4-0.6% of patients.[4,5]

We report a case of abducens palsy as the presenting symptom of MS, which highlights the importance of considering MS in the differential diagnosis of isolated or multiple cranial nerve palsies.

Case Report

A 28-year-old man with no significant past medical history except keratoconus in the right eye was assessed in the neuro-ophthalmology clinic for horizontal diplopia of 2 weeks' duration. He was not on any medications. Family history and social history were non-contributory. Onset of the diplopia was insidious, and there were no other associated neurological symptoms. Three days after the onset of diplopia he had paresthesia in the right upper extremity. This sensory symptom was mild and self-resolved in 2 days. On examination, best corrected visual acuity was 20/50 in the right and 20/30 in the left eye. Abduction was 70% of normal in the left eye, while the remaining extraocular movements were normal (Figure 1). Optic discs were normal. The rest of the neurological exam was unremarkable. Screening for vascular risk factors and autoimmune disorders as well as thyroid function tests were normal. MRI brain revealed several T2/FLAIR hyperintense lesions in the subcortical white matter, predominantly involving the periventricular regions with perpendicular orientation to the ventricular margins. There were scattered lesions in the juxtacortical left frontal region, midbrain, and left cerebellar hemisphere. Spinal MRI revealed multiple T2 hyperintense lesions involving the cervical and thoracic spine. The imaging appearance was highly suggestive of demyelination. The patient was started on glatiramer acetate injections (Copaxone; Teva Pharmaceuticals, Toronto, Canada). In follow-up assessment at 4 months, the left abducens palsy had resolved (Figure 2).

Discussion

The differential diagnosis of abduction palsy includes vasculopathy (including diabetic), inflammatory causes, thyroid eye disease, trauma, and congenital and acquired myasthenia

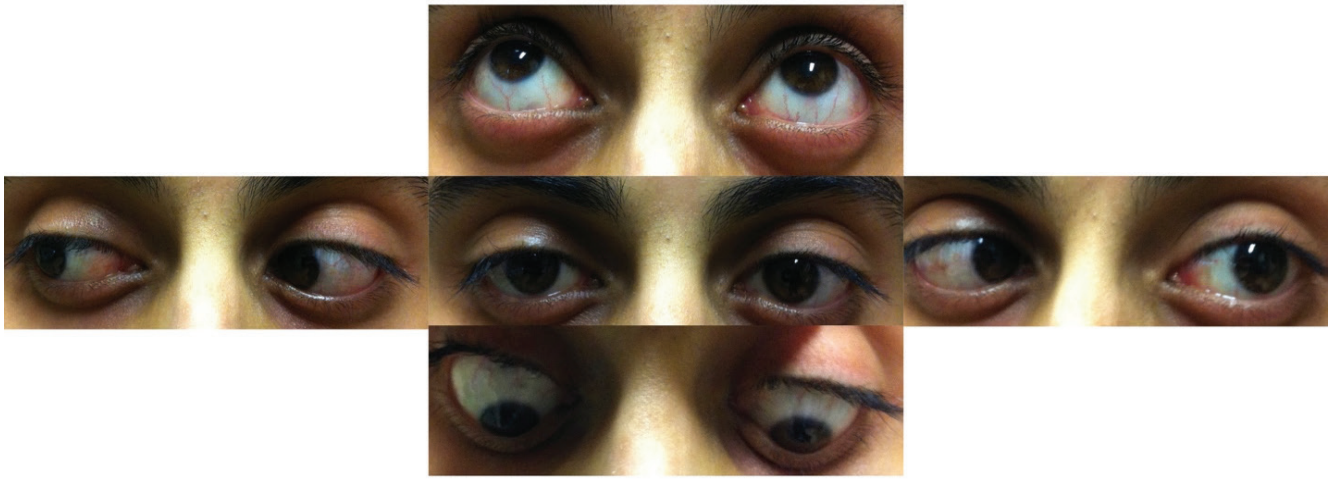


Figure 1. Abduction restriction in the left eye. Pictures taken two weeks after onset of diplopia

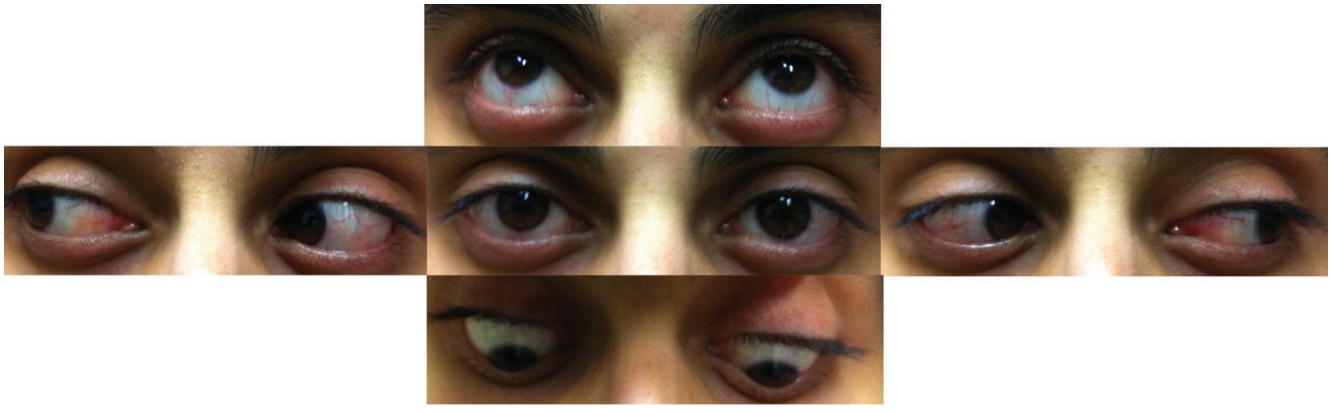
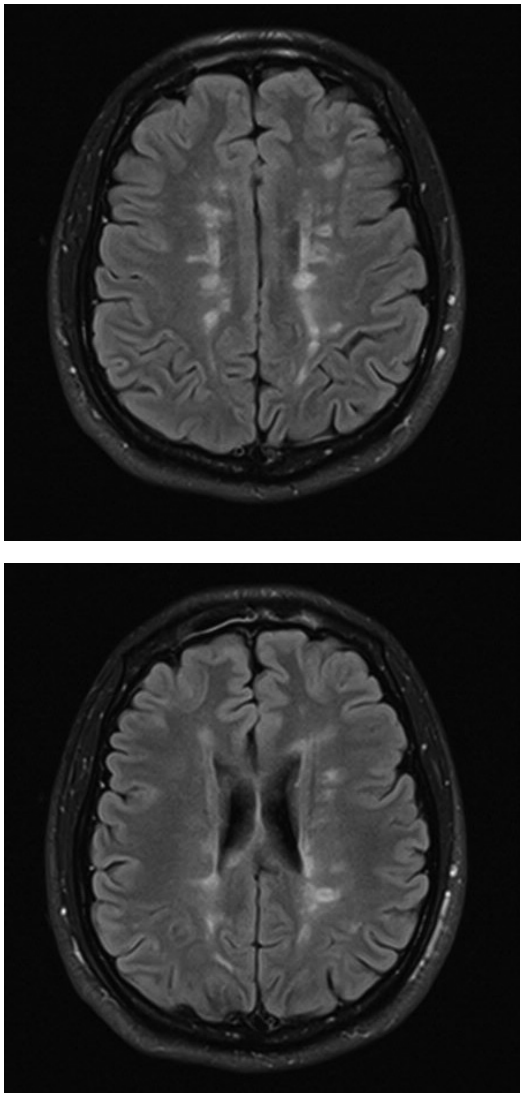


Figure 2. Pictures taken at 4-month follow-up visit showing resolution of the left abducens palsy

gravis. This case presented with MRI findings of demyelination in the brain and spinal cord, supporting the diagnosis of MS, and the abducens palsy resolved before the 4-month follow-up.

MS has been known to cause abnormal eye movements and diplopia due to lesion effects on the cranial nerves. Previous case reports and series discuss isolated nerve palsies in the context of both the presentation and relapse of MS.[5,6,7,8] In 1997, a report detailed 24 patients with MS that had isolated cranial nerve palsies, of which 14 patients had isolated nerve palsies as the presenting symptom (1 third, 1 fourth, 6 sixth, 3 seventh, and 3 eighth cranial nerve), while the remaining 10 patients presented in the context of a relapse.[6] MRI revealed demyelination in more than one location in 11 of the 14 patients.[6] The authors found that the patients most commonly experienced sixth cranial nerve palsy (50%; 12/24) while the remaining patients had third, fourth, eighth, and seventh nerve palsies.[6] Four patients who initially presented with sixth nerve palsy had ipsilateral pontine lesions.[6] A 2002 review determined that 10.4% of 483 MS patients had an isolated cranial nerve palsy, most commonly fifth cranial nerve (4.8%) and seventh cranial nerve (3.7%) followed by sixth (1.0%), third (0.4%), and eighth cranial nerves (0.4%).[4] These palsies were uncommonly the presenting symptom-specifically involving the third (0.4%), fifth (3.5%), sixth (0.6%), and seventh (2.7%) cranial nerves.[4] In non-traumatic sixth nerve palsies, MS was found to be the cause of 24% of cases in patients aged 20-50.[9]



Figures 3 and 4. MRI brain axial FLAIR sequences showing multiple periventricular white matter hyperintense lesions with perpendicular orientation to the ventricular margins, consistent with demyelination
MRI: Magnetic resonance imaging

Bet-Shlimon and Etienne[10] reported isolated abducens nerve palsy in MS. MRI revealed an enhancing lesion in the medial pons on MRI that correlated with an abducens palsy and an additional non-active lesion. Barr et al.[5] detailed three cases of isolated sixth nerve palsy as the only clinical symptom of MS in patients later diagnosed with MS. They discovered that 0.5% of MS patients presented with isolated sixth nerve palsy in their neuro-ophthalmology clinic over 16 years, supporting it as a rare presentation.[5] Two of the cases had discrete hyperintense lesions in the fasciculus of the pontine segment of the left side.[5] Our patient had a lesion in the midbrain, but there were no lesions in the pons. We propose that there was demyelination of the fascicular portion of the left abducens nerve without radiological evidence. Also, the abducens nucleus on that side was spared. For this reason, the patient presented with no gaze palsy and preservation of adduction in the fellow eye.

Isolated abducens palsy as the presenting symptom of MS is rare. This case report adds to existing literature on the topic and supports the inclusion of MS in the differential diagnosis for an isolated abducens nerve palsy.

Ethics

Informed Consent: The patient provided written consent.
Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: M.J.G., A.N.E.S., Design: M.J.G., A.N.E.S., Data Collection or Processing: A.N.E.S.,

Analysis or Interpretation: M.J.G., A.N.E.S., Literature Search: M.J.G., Writing: M.J.G., A.N.E.S.

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References

1. Zawada MW, Campanella JJ. Multiple sclerosis. Magill's Med Guide. 2019.
2. Thompson AJ, Banwell BL, Barkhof F, Carroll WM, Coetzee T, Comi G, Correale J, Fazekas F, Filippi M, Freedman MS, Fujihara K, Galetta SL, Hartung HP, Kappos L, Lublin FD, Marrie RA, Miller AE, Miller DH, Montalban X, Mowry EM, Sorensen PS, Tintoré M, Traboulsee AL, Trojano M, Uitdehaag BMJ, Vukusic S, Waubant E, Weinshenker BG, Reingold SC, Cohen JA. Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. Lancet Neurol. 2018;17:162-173.

3. Walsh RD, McClelland CM, Galetta SL. The neuro-ophthalmology of multiple sclerosis. Future Neurol. 2012;7:679-700.
4. Zadro I, Barun B, Habek M, Brinar VV. Isolated cranial nerve palsies in multiple sclerosis. Clin Neurol Neurosurg. 2008;110:886-888.
5. Barr D, Kupersmith MJ, Turbin R, Bose S, Roth R. Isolated sixth nerve palsy: an uncommon presenting sign of multiple sclerosis. J Neurol. 2000;247:701-704.
6. Thömke F, Lensch E, Ringel K, Hopf HC. Isolated cranial nerve palsies in multiple sclerosis. J Neurol Neurosurg Psychiatry. 1997;63:682-685.
7. Muhammed K, Ball J. Multiple sclerosis causing a partial sixth nerve palsy. Case Rep. 2014;2014:bcr2013201239.
8. Uzawa A, Mori M, Ito S, Kuwabara S. Neurological picture. Isolated abducens and facial nerve palsies due to a facial collicular plaque in multiple sclerosis. J Neurol Neurosurg Psychiatry. 2011;82:85-86.
9. Peters GB 3rd, Bakri SJ, Krohel GB. Cause and prognosis of nontraumatic sixth nerve palsies in young adults. Ophthalmology. 2002;109:1925-1928.
10. Bet-Shlimon S, Etienne M. Isolated Abducens Palsy as the First Presenting Sign of Multiple Sclerosis. Case Rep Neurol. 2017;8:272-275.