Case Report

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Myelin Oligodendrocyte Glycoprotein Antibody-Associated Disease Presenting with ADEM-Like Encephalomyelitis: A Case Report and Current Literature Review

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Abstract

Myelin oligodendrocyte glycoprotein antibody-associated disease has recently been found to be a different nosological entity, with some clinical features overlapping with neuromyelitis optica spectrum disorders. We hereby describe the case of a patient who was first admitted in 2015 with a tingling sensation in both legs, severe lumbar pain, and gait problems, and later developed urinary retention, confusion, and seizure. Brain magnetic resonance imaging (MRI) showed multiple fluid attenuated inversion recovery hyperintense lesions with no gadolinium enhancement in the bilateral subcortical white matter, cerebellar peduncles, and cervical cord. Cerebrospinal fluid analysis demonstrated marked pleocytosis (116 cells/μL) and an elevated protein concentration (68 mg/dL). Neither oligoclonal bands nor the elevation of IgG index levels were detected (IgG index: 0.59). During the follow-up, he had 2 optic neuritis attacks in 4 years. Five years later, the patient was referred to our hospital with severe pain in both legs. Spinal MRI showed a longitudinally extending conus medullaris lesion with gadolinium enhancement. The patient showed full recovery after 7 days of 1000 mg/day IV methylprednisolone treatment, and the follow-up MRI showed no residual lesions. The anti-MOG IgG was found to be positive. In this case report, we would like to highlight the importance of MOG antibody testing in encephalitis.

Keywords: Anti-MOG, demyelinating disease, ADEM, optic neuritis, transverse myelitis

Introduction

Recently, it has been discovered that myelin oligodendrocyte glycoprotein antibodies (anti-MOG IgG) play a diagnostic role regarding acquired demyelinating diseases. MOG antibody-associated disease is now deemed a nosologically different entity, showing clinical and paraclinical differences from multiple sclerosis and neuromyelitis optica spectrum disorder (NMOSD) (1,2).

The average age of onset for MOG antibody-associated disease is in the third decade of life, with a male predominance (3,4).The most common core feature is optic neuritis (ON), followed by transverse myelitis (5). Although MOG IgG positivity is common in children with acute disseminated encephalomyelitis (ADEM), ADEM-like presentation in adults is rare.

Here, we report a patient who presented with ADEM-like encephalomyelitis, who has shown a relapsing disease course (two ON attacks and lastly, longitudinally extending TM).

Case Report

A 22-year-old man suffered from tingling sensations in both legs, severe lumbar pain, and gait problems in 2015. He was admitted to the hospital after developing urinary retention, confusion, and generalized onset tonic-clonic seizures. A neurological examination revealed horizontal nystagmus revoked by downward gaze, bilateral positive Babinski sign, hyperactive patellar and Achilles reflexes, and bilateral Achilles tendon clonus. Magnetic resonance imaging (MRI) showed multiple expanded high signal

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intensity lesions with no gadolinium enhancement in the subcortical white matter of both cerebral hemispheres, cerebellar peduncles, and cervical cord (Figure 1A, B).

Cerebrospinal fluid (CSF) analysis demonstrated marked pleocytosis (116 cells/μL) and elevated protein concentration (68 mg/dL). Neither the oligoclonal band nor the elevation of IgG index levels were detected (IgG index: 0.59). The electroencephalography showed no epileptogenic activity. Various vascular and serologic tests, including antinuclear antibody, anti-ds DNA, anti-SSA, anti-SSB, and HIV, were all negative. CSF culture showed no growth. During the disease course, the patient developed a fever. In conjunction with the CSF and MRI findings, the preliminary diagnosis was viral infectious encephalitis, and antiviral treatment was administered. Five days later, repeated MRI showed new hyperintense lesions in the mesencephalon and thalamus with no gadolinium enhancement (Figure 1C, D), which led to the alteration of the differential diagnosis to acquired demyelinating disease. Intravenous methylprednisolone (IVMP) 1 g/day was administered for five days. The symptoms regressed within a week, and the follow-up MRI demonstrated no residual lesions.

Seven months later, he was referred to our hospital with blurry vision and a neurological examination showed temporal visual field loss in the right eye. The fundoscopic examination was normal, which incited a diagnosis of retrobulbar ON, and 5 days of 1000 mg/day IVMP were administered. The patient fully recovered after the treatment and AQP4 IgG was found negative in the blood serum [enzyme-linked immunosorbent assay (ELISA)].

Four years later (09/2019), he suffered from temporary blurry vision for a month but didn't apply to a hospital. Five years after the first admission (03/2020), the patient was referred to our hospital with severe pain in both legs. A neurological examination showed bilateral Babinski sign positivity. Spinal MRI showed a longitudinally extending conus medullaris lesion with gadolinium enhancement (Figure 1E). Consent wasn't given for lumbar puncture, so CSF analysis couldn't be done. After 7 days of 1000 mg/day IVMP, the patient showed full recovery, and the follow-up MRI showed no residual lesions. The Anti-AQP4 IgG test was repeated and found negative. The anti-MOG IgG test was positive (Both tests were done with ELISA). Rituximab treatment was started and sustained clinical stability was reached. Written consent was obtained from the patient for this article.

Discussion

Myelin oligodendrocyte glycoprotein is found on the surface of myelinating oligodendrocytes and is considered to be a cell adhesion molecule. It also plays

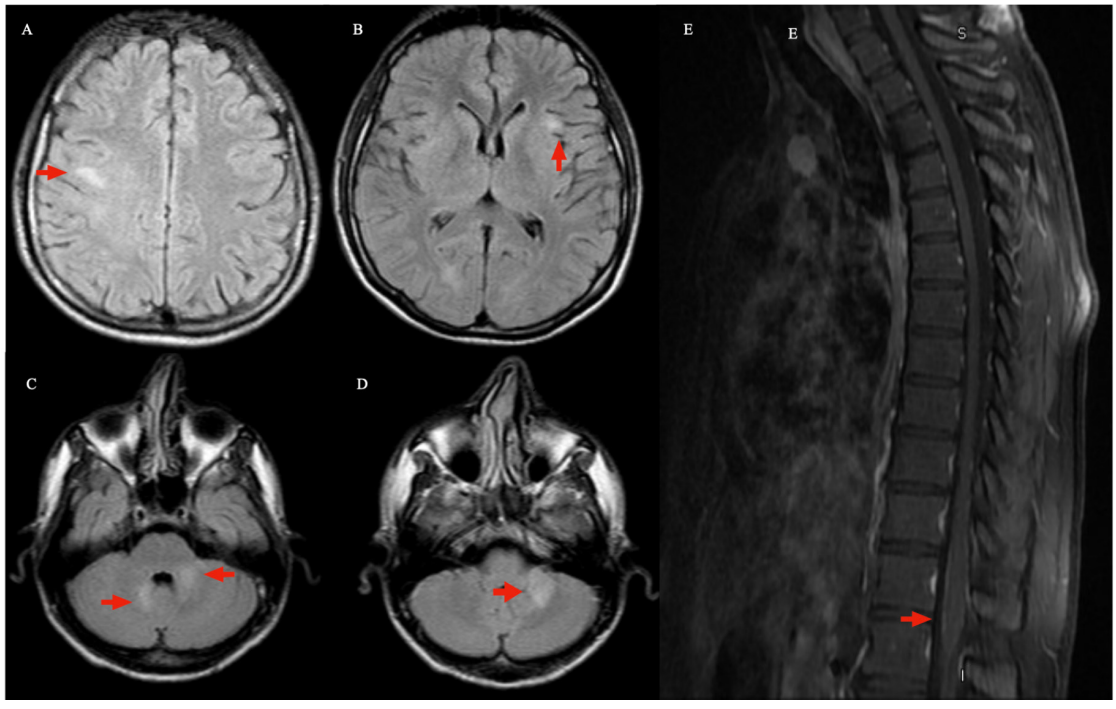

Figure 1. A, B) Fluid attenuated inversion recovery (FLAIR) axial image from the first admission. Bilateral subcortical FLAIR hyperintense lesions (lower left). C, D) High signal intensity lesions in both cerebellar peduncles (upper left). E) T2 hyperintense longitudinally extending conus medullaris lesion with gadolinium enhancement on T1-weighted MRI (right)
MRI: Magnetic resonance imaging

a role in the activation of the complement cascade, causing MS type 2 demyelination in mice and inducing T cell-mediated experimental autoimmune encephalitis (3). Over the years, a subgroup of patients, priorly diagnosed as seronegative NMOSD, was found to be positive for anti-MOG IgG1 and the lesions showed pathophysiological differences. Since anti-MOG IgG and AQP4 positivity very rarely coincide with these histopathological differences, it's hypothesized that these are two distinct diseases (3,6).

MOG-associated disease was first identified in pediatric patients with ADEM-like presentation. Further studies have shown distinct clinical features that include, most commonly in TM, brainstem involvement, and ADEM-like encephalomyelitis (5). During the disease course, acute supratentorial encephalitis prevalence has been reported as 14%, but only 4% of the patients had encephalitis at onset (1).

In previous literature, higher rates of epileptic seizures have been reported for anti-MOG positive cases in comparison with patients with NMO, and most of these MOG related encephalitis cases have been primarily diagnosed with viral or autoimmune encephalitis (7,8), similar to our case because it can mimic infectious encephalitis due to the similarity of CSF and MRI findings. Therefore, an important portion of encephalitis cases with seizures were treated with antibiotherapy before the final diagnosis (8,9). In this study, which also presented with encephalopathy and seizure, brain MRI and CSF findings led to the preliminary diagnosis of infectious encephalitis. The patient was initially treated with acyclovir. Recently, a novel clinical phenotype has been identified as FLAMES in patients who present with seizures and unilateral encephalitis with cortical FLAIR hyperintense lesions (10). Because of the lack of cortical lesions in this case, a retrospective diagnosis of FLAMES was made in this study.

In 2015, anti-MOG IgG testing was unavailable for clinical use in Turkey. During the follow-up, the patient had an ON attack, which brought MOG antibody-associated disease into prominence, but the non-compliance of the patient made the testing improbable. Finally, because of the longitudinally extending TM attack, MOG was near the top of the differential diagnosis, and the increasing use of anti-MOG IgG tests allowed the diagnosis to be completed.

MOG antibody-associated disease is an emerging diagnosis for patients who have been previously diagnosed with seronegative NMOSD. With this case report, we would like to highlight the importance of MOG antibody testing for adult patients presenting with acute demyelinating encephalomyelitis.

Ethics

Informed Consent: Written consent was obtained from the patient for this article.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Concept: C.E.T., Design: C.E.T., Data Collection or Processing: M.D.B., E.B.D., B.P.B., Analysis or Interpretation: C.E.T., Literature Research: C.E.T., Writing: C.E.T.

Conflict of Interest: No conflict of interest was declared by the authors.

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