Myelin Oligodendrocyte Glycoprotein Antibody Syndrome and Seizures: A Diagnostic Clue

Sir,

Myelin oligodendrocyte glycoprotein (MOG) antibodies are highly conserved proteins expressed on the oligodendrocytes of mammals, including human beings. They have been detected in various demyelinating disorders like optic neuritis, transverse myelitis, and acute disseminated encephalomyelitis (ADEM) and the term MOG-encephalomyelitis (MOG-EM) has been proposed to unify these heterogenous presentations. There is growing evidence of seizures as a manifestation of MOG-EM. We present three teenagers who presented with seizures in association with focal neurological deficits and were eventually diagnosed as MOG-EM, emphasizing that this initial history of seizures might help clinch this diagnosis, over other demyelinating disorders.

Case 1: A 12-year-old girl presented with acute onset unsteadiness and imbalance while walking and diminution of vision from both eyes, over a few days. On evaluation, magnetic resonance imaging (MRI) brain revealed multiple confluent and discrete contrast enhancing lesions in the brain parenchyma with bilateral optic neuritis [Figure 1]. She was treated empirically with intravenous methylprednisolone (IVMP) with complete symptomatic improvement, following which she came to us for detailed evaluation. Examination revealed no focal deficits and repeat imaging [Figure 2] revealed decrease in lesion size and resolution of enhancement, without any additional lesion. She had a history of recurrent seizures (right focal to bilateral tonic clonic) at 6 years of age for which she was evaluated and found to have normal brain imaging and was treated with sodium valproate. Subsequently, she was seizure-free and the drug was discontinued 1 year ago. However, she had seizure recurrence (left focal to bilateral tonic clonic), 1 month prior to symptom onset and was controlled with oxcarbazepine. Her cerebrospinal fluid (CSF) examination was acellular, with a protein and glucose content of 20.9 mg/dl and 56.9 mg/dl (corresponding random blood sugar-91 mg/dl), respectively. CSF oligoclonal bands, Venereal Disease Research Laboratory (VDRL), gene Xpert for tuberculosis, India Ink staining, and Cryptococcal antigen testing were all negative. Serum aquaporin-4 antibody was negative but serum MOG antibody by cell-based assay was positive. She was continued on oral steroids and azathioprine followed by gradual taper with no relapses.
Case 2: A 13-year-old boy presented with recurrent episodes of focal neurological deficits associated with fever since the past 7 years. He had two episodes of pure motor paraparesis with stiffness of limbs, and one episode of horizontal binocular diplopia, all of which were exquisitely responsive to corticosteroids. He also had history of febrile seizures (semiology: generalized tonic clonic) at the age of 5 years (imaging: Not done) and one episode of febrile status epilepticus 6 months later, which required ventilator assistance and treatment in the hospital for 10 days. His current complaints were acute onset progressive difficulty in walking associated with difficulty gripping objects. Examination revealed grade 1+ spasticity in all 4 limbs (modified Ashworth scale), power of bilateral 4/5 and 5/5 in the lower and upper limbs (modified research council) respectively, and a handgrip of 80%. Sensory examination was normal and deep tendon reflexes were brisk with bilateral extensor plantar. His previous and follow up MRI brain and

![Figure 1: Axial T1-WI (a) shows focal area of hypointensity (arrow in A) in left precentral cortical region, which is hyperintense (arrows in b and c) on T2-WI (b) and FLAIR images (c). On follow-up imaging, axial T2-WI (d) and FLAIR (e, f) images show multifocal hyperintense lesions in bilateral dentate nuclei and adjacent white matter (Right side > left, arrows in d, e, and g), left middle cerebellar peduncles, right anterolateral pons (arrowheads in d, e, and g), left posterior thalamus (arrowhead in f and h), and both occipital lobes (arrows in f and H). On contrast administration, axial T1-WIs (g and h) shows patchy enhancement within these lesions.](image)

![Figure 2: Axial T2-W (a and b) and coronal FLAIR (c) images show areas of hyperintensities in bilateral frontal lobes (arrowheads in b and c) and left thalamus (arrow in b and c). No diffusion restriction is seen in diffusion trace images (c) and ADC maps (d). No enhancement is seen following gadolinium administration in T1-WI (g). Sagittal T2 (g) images show no focal lesions in the spinal cord.](image)
the last MRI spine images are provided in Figures 3, 4, and 5, respectively. Possibilities of primary demyelination versus secondary (vasculitis, sarcoidosis, Behcet’s, mitochondrial) were considered and he was evaluated for the same. CSF examination, vasculitic panel, serum angiotensin converting enzyme (ACE) levels, HLA-B51, and CPK levels were normal. His VEP was bilaterally prolonged and although aquaporin-4 antibody was negative, his serum MOG antibody was strongly positive. Considering his background of multiple relapses, he was treated with rituximab with good symptomatic improvement.

Case 3: A 14-year-old boy presented with acute onset vision loss from the right eye, over a few days, which completely

Figure 3: Axial T2-WIs (a and b) shows bilateral almost symmetrical areas of cortical hyperintensities in frontal and temporal lobes. The lesions are bright in diffusion trace images (c) and dark on ADC maps suggesting diffusion restriction. No enhancement is seen following gadolinium administration in T1-WI (not shown). Follow-up MRI done after 9 days shows progression of T2 hyperintensities to involve bilateral inferior frontal gyri (arrows in f) in axial T2-WI (e and f). Diffusion trace image (g) and ADC maps (h) show fresh areas of diffusion restriction in bilateral periventricular white matter (arrow in g and h)

Figure 4: FU MRI after 13 months. Axial T2-WIs (a and b) shows prominent Sylvian fissures and loss of white matter in both frontal lobes suggestive of atrophy. Diffusion trace images (c and d) show bright areas of diffusion restriction in left posterior temporal lobes (arrow in c), right frontal lobe (arrowhead in c), and bilateral medial frontal regions (arrows in d). No enhancement is seen following gadolinium administration in T1-WI (not shown). IADSA of left ICA (e), right ICA (f), and right VA (g) were unremarkable without any evidence of vasculitis. FU MRI done after another 14 months shows regression of lesions with atrophy
Testing for serum MOG antibodies should strongly be considered in patients who present with focal seizures but have normal brain imaging or who do not respond adequately to anti-epileptic therapy. Their relevance in prognosticating the risk for developing a future demyelinating event needs to be investigated through well-designed trials.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

**Highlights**
- Serum MOG antibodies have been detected in various demyelinating disorders: optic neuritis, transverse myelitis, and acute disseminated encephalomyelitis (ADEM).
- MOG-encephalomyelitis (MOG-EM) has been proposed to unify these heterogenous presentations.
- There is growing evidence of seizures as a manifestation of MOG-EM.
- Testing for serum MOG antibodies should strongly be considered in patients with isolated seizures (especially when clustering is present) and unexplained encephalitis. They can be even considered in patients who present with focal seizures but have normal brain imaging or who do not respond adequately to anti-epileptic therapy. Their relevance in prognosticating the risk for developing a future demyelinating event needs to be investigated through well-designed trials.
Letters to the Editor

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Submitted: 13-Feb-2021 Revised: 21-Apr-2021 Accepted: 03-May-2021 Published: 27-Sep-2021

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DOI: 10.4103/aian.AIAN_131_21