Anti-Myelin Oligodendrocyte Glycoprotein Antibody Positive Acute Disseminated Encephalomyelitis Post-Varicella Zoster Virus Infection

Sir,

Acute disseminated encephalomyelitis (ADEM) is a rapidly progressive inflammatory demyelination of the brain and spinal cord. The incidence of ADEM has been reported to be between 0.4 and 0.8 per 100,000 of population.[1] Anti-myelin oligodendrocyte glycoprotein (MOG) antibody is associated with 30-50% cases of ADEM.[2] Varicella zoster virus (VZV) infection has never been reported to be associated with anti-MOG associated demyelination. We are reporting a case of a 15-year-old female patient presented with ADEM post VZV infection with positive anti-MOG antibody.

A 15-year-old girl presented with complaints of numbness and weakness of both the lower limbs for 2 days. The weakness started 2 days back and progressed to the extent that she was not able to stand and became bedridden. She also experienced loss of sensations below the umbilicus along with inability to pass urine for the last 2 days. She denied any weakness of upper limbs, shortness of breath, difficulty in swallowing, facial deviation, diplopia, blurring of vision, headache, vomiting, or recent vaccination. She had high-grade fever 15 days back lasting for 5 days associated with generalized itchy fluid filled rashes. Examination revealed normal vitals. Multiple healed crusted pigmented lesions were present all over her body. [Figure 1] Neurological examination revealed bilateral upper motor neuron type paraplegia; however, power in both upper limbs was normal. Deep tendon reflexes were brisk in upper and lower limbs with extensor plantar response. Sensory examination revealed 60% of loss of all primary sensations below umbilicus. Based on the above presentation, clinical diagnosis of acute transverse myelitis was kept, and the patient was started on intravenous injection of methylprednisolone 1 gm daily for 5 days along with intravenous injection of acyclovir 800 mg 8 hourly.

Investigations showed normal hematological and biochemical parameters. Cerebrospinal fluid (CSF) examination showed lymphocytic pleocytosis with a total cell count of 45, sugar of 48 mg/dl, and protein of 81 mg/dl. CSF sample for the VZV antibody was sent for examination. Tubercular polymerase chain reaction was negative in CSF. Magnetic resonance imaging (MRI) spine revealed long segment hyperintensities in cervical and thoracic regions from C2 till T12 in T2-weighted and fluid attenuated inversion recovery (FLAIR) sequences without postcontrast enhancement. [Figure 2] MRI brain revealed hyperintensities in frontoparietal and occipital subcortical regions and deep white matter in T2-weighted and FLAIR sequences without postcontrast enhancement. [Figure 3] Anti-MOG IgG in serum was sent for examination in view of ADEM. Meanwhile, the patient showed significant improvement. She started walking and regained her bladder bowel control. VZV antibodies in CSF came out to be negative while anti-MOG titers were highly positive in serum by indirect immunofluorescence. A diagnosis of anti-MOG antibody positive ADEM post VZV infection was made based on clinical presentation, imaging, serological, and CSF findings. Patient was discharged on oral prednisolone 1 mg/kg/day which was tapered off and stopped after 4 weeks. She is asymptomatic on follow-up visits.

ADEM results from inflammation of CNS which can be triggered by infection or vaccination. Anti-MOG antibodies are detected in 30–50% of children with ADEM with monophasic form and almost all cases with relapsing course.[2] Anti-MOG antibodies are also associated with other demyelinating neurological diseases like optic neuritis, myelitis, and aquaporin negative neuromyelitis optica spectrum disorder (NMOSD). Few patients with anti-MOG antibody related demyelination have reported prodromal illnesses. Epstein-Barr virus, Borrelia, Herpes Simplex Virus, and Influenza were also reported in some cases.[3,4] Here, we reported a case of anti-MOG antibody positive ADEM presented 2 weeks after VZV infection.

Prevalence of neurological complications in VZV is 0.03%.[5] Most common neurological complications are cerebellar ataxia and encephalitis. Patients can also develop rare complications

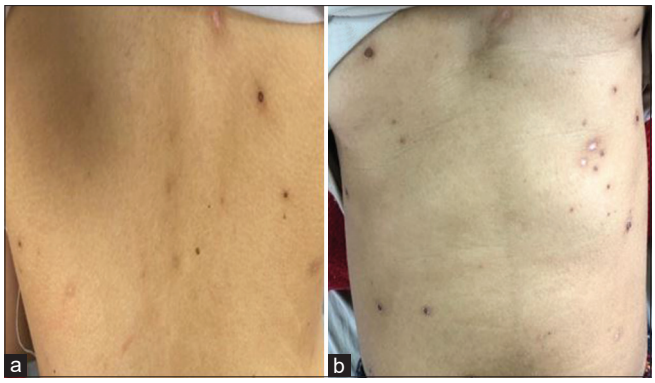

Figure 1: Generalized healed crusted lesions on the body

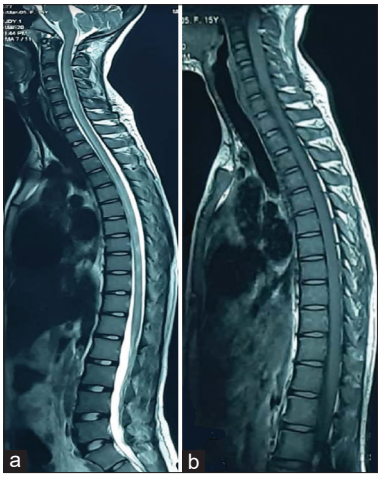

Figure 2: MRI spine revealing long segment hyperintensities in the cervical and thoracic region on T2-weighted image (a) without postcontrast enhancement (b)

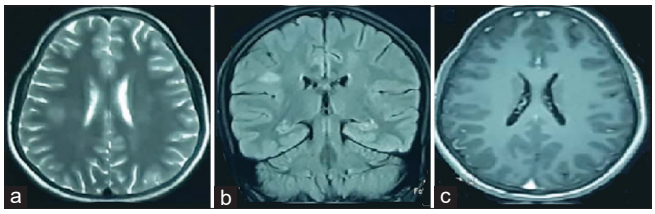

Figure 3: MRI brain showing hyperintensities in frontoparietal in T2-weighted (a) and FLAIR sequences (b) without postcontrast enhancement (c)

like transverse myelitis, aseptic meningitis, optic neuritis, Guillain–Barré syndrome, meningoencephalitis, ventriculitis, post-herpetic neuralgia, herpes zoster ophthalmicus, Reye's syndrome, and facial paralysis.

Previous studies have suggested the mechanism of molecular mimicry or direct inflammatory damage to myelinated neurons for the post VZV ADEM.[6] Direct inflammatory damage could be ruled out in our case as CSF VZV antibodies were negative. However, molecular mimicry could be the possible pathogenesis. Presence of Anti-MOG antibody in our patient could generate the hypothesis of MOG as the possible target for molecular mimicry. Few cases of ADEM associated with VZV have been reported in the literature but none of them were tested for anti-MOG antibody.[5,7]

Anti-MOG antibodies can cause monophasic or relapsing disease and are predominantly present in males under 10 years of age. Patients with higher age, female sex, and high anti-MOG titers at onset have a high risk of developing recurrent disease.[8] Thus, follow-up is required in such patients as chances of another demyelinating event is high. Hennes *et al*., followed 60 anti-MOG antibody positive ADEM patients for 24 months. After 24 months, 46/60 children retained their final diagnosis of ADEM. A total of 14 of 60 children had further demyelination events and were diagnosed with neuromyelitis optica spectrum disorder in 1, multiple sclerosis in 2, multiphasic ADEM in 8, and ADEM with optic neuritis in 3 patients.[8] Patients with multiple relapse or severe first attack with incomplete recovery need maintenance treatment with immunosuppressives to decrease the risk of relapse.[9] We did not start our patient on maintenance therapy as it was her first episode and she had excellent response to treatment without any residual deficits.

VZV has been previously associated with production of anti-MOG antibody-related disease. This case encourages more studies to find the possible molecular mimicry of VZV antigen with MOG. Patients with post-varicella ADEM should also be tested for anti-MOG antibodies as chances of future episodes of demyelination are higher and thus management and prognosis would be different.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. The patient and her parents have given consent for her images and other clinical information to be reported in the journal. They understand that her name and initials will not be published, and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Abhishek Yadav, Roopa Sharma, Mahantesh P. Ganiger, Gaurav Sharma

Department of Internal Medicine, Maulana Azad Medical College, New Delhi, India

Address for correspondence: Dr. Roopa Sharma, PO Sultanpur, Chamba, Himachal Pradesh, India.
E-mail: roopasharma8@gmail.com

References

1. Noorbakhsh F, Johnson RT, Emery D, Power C. Acute disseminated encephalomyelitis: Clinical and pathogenesis features. Neurol Clin 2008;26:759-80.
2. Hacohen Y, Absoud M, Deiva K, Hemingway C, Nytrova P, Woodhall M, *et al*. Myelin oligodendrocyte glycoprotein antibodies are associated with a non-MS course in children. Neurol Neuroimmunol Neuroinflamm. 2015;2:e81.
3. Amano H, Miyamoto N, Shimura H, Sato D, Fujihara K, Ueno S, *et al*.

Influenza-associated MOG antibody-positive longitudinally extensive transverse myelitis: A case report. BMC Neurol 2014;14:224.
4. Wynford-Thomas R, Jacob A, Tomassini V. Neurological update: MOG antibody disease. J Neurol 2018;266:1280-6.
5. Girija AS, Rafeeque M, Abdurehman KP. Neurological complications of chickenpox. Ann Indian Acad Neurol 2007;10:240-6.
6. Lee YJ. Acute disseminated encephalomyelitis in children: Differential diagnosis from multiple sclerosis on the basis of clinical course. Korean J Pediatr 2011;54:234-40.
7. Wang Q, Cai L, Wang X. Acute disseminated encephalomyelitis following varicella-zoster virus infection: Case report of effective treated both in clinical symptom and neuroimaging. Brain Behav 2019;9:e01374.
8. Hennes E, Baumann M, Schanda K, Anlar B, Bajer-Kornek B, Blaschek A, *et al*. Prognostic relevance of MOG antibodies in children with an acquired demyelinating syndrome. Neurology 2017;89:900-8.
9. Hacohen Y, Banwell B. Treatment approaches for MOG-Ab-associated demyelination in children. Curr Treat Options Neurol 2019;21:2.

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