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Myelin Oligodendrocyte Glycoprotein Antibody-associated Disease and an Incidental Thyroid Nodule

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Abstract

Myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD) is a rare, immune-mediated demyelinating disease of the central nervous system (CNS) that has a predilection for children. Its association with malignancy or other autoimmune diseases is unclear. We present a case of MOGAD in a teenager with a coincidental thyroid malignancy and elevated intracranial pressure.

Keywords

autoimmune, neuroimmunology, neuroophthalmology, other, intracranial hypertension

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Introduction

Myelin oligodendrocyte glycoprotein (MOG) is a surface protein on oligodendrocytes. Antibodies to this protein can trigger an inflammatory cascade of recurrent bouts of CNS demyelination that include acute disseminated encephalomyelitis (ADEM), optic neuritis, and transverse myelitis.[1] Collectively this group of demyelinating diseases is termed MOGAD. MOGAD has a clinical phenotypic overlap with aquaporin-4-immunoglobulin G antibody positive (AQP4-IgG+) Neuromyelitis Optica spectrum disorders (NMOSD). AQP4-IgG + NMOSD is known to coexist with various autoimmune diseases and cancers, however, the association between MOGAD and these conditions is less clear.[2] This case illustrates a patient with markedly increased intracranial pressure (ICP) who was found to have MOGAD and a concurrent, incidental thyroid malignancy.

Case

A 17-year-old non-obese male with a recent history of a single unprovoked seizure, presented to an outside hospital with unilateral eye pain, blurry vision, and optic nerve swelling. The lumbar puncture opening pressure was elevated to 28 cmH2O. A Non contrast MRI showed signs consistent with elevated intracranial pressure, but no intracranial mass was identified. He was treated with acetazolamide and was transferred to our institution with a presumptive diagnosis of idiopathic intracranial hypertension.

Physical examination revealed an afebrile patient in no acute distress with normal vital signs. Neurological examination was remarkable for pain with extraocular movements, bilateral 5 mm pupillary dilations with adequate response to light, decreased visual acuity 20/50 OD and 20/40 OS. Fundoscopic exam revealed bilateral mild optic nerve swelling. Brain and optic magnetic resonance imaging (MRI) revealed bilateral optic neuritis with scattered white matter T2 hyperintensities (Figure 1). A MRI spine with contrastwas remarkable only for an incidental thyroid nodule.

A repeat LP was performed which was remarkable for an opening pressure of 40 cmH2O with CSF analysis showing pleocytosis of 24 WBC/mm3, normal protein, and glucose.

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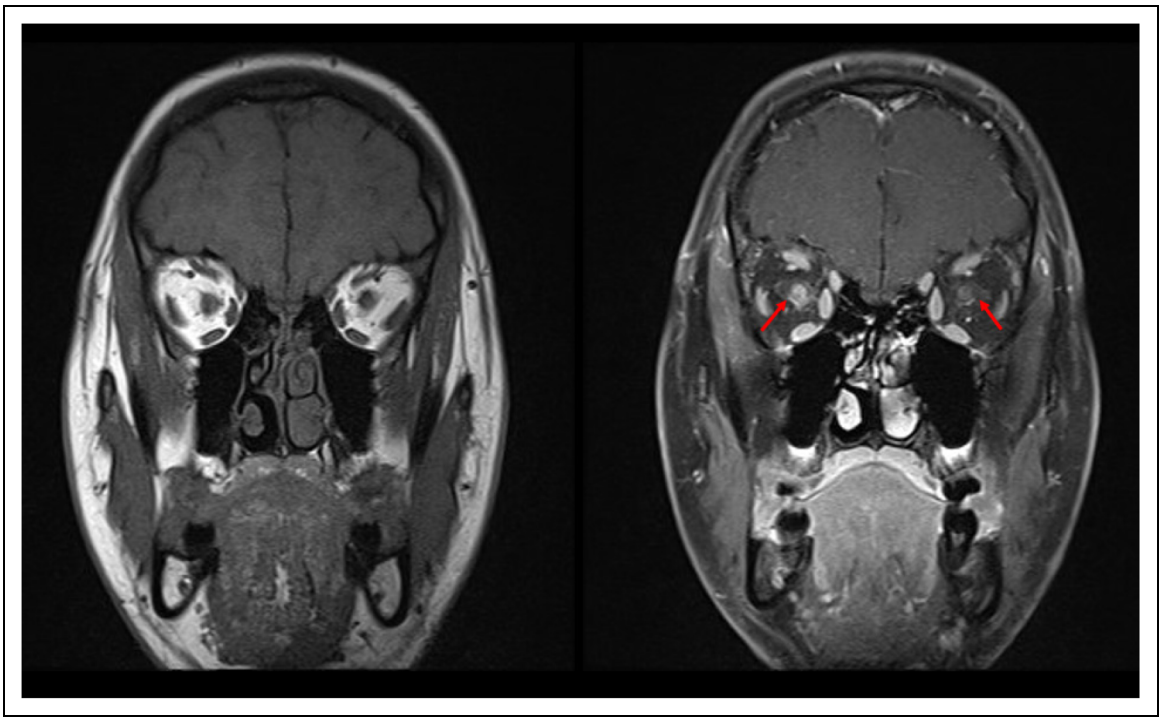

Figure 1. Coronal T1 and coronal T1 fat sat post contrast views show enlargement and enhancement of the optic nerves, right greater than left (red arrows). There is also mild enhancement surrounding the optic nerves consistent with inflammation.

CSF studies for infectious diseases (C. neoform, CMV, Enterovirus, E. coli K1, H. influenza, HSV, Listeria, N. meningitidis, parechovirus, S. agalactiae, S. pneumonia and VZV) were negative. Paraneoplastic antibody panel [ANNA-1, ANNA-2, PCCA-1 and PCCA-Tr(DNER) antibodies] was negative. The Oligoclonal band profile was negative. Autoimmune demyelinating panel in the serum was positive for MOG IgG antibodies at a titer of 1:40 (normal range for MOG antibody titer <1:10) and negative NMO antibodies. He was then diagnosed with MOGAD.

While in the hospital, fine needle aspiration of the thyroid nodule was performed, which came positive for papillary carcinoma with vascular invasion and lymph node involvement.

The patient received 2 gm/kg of intravenous immunoglobulin (IVIG) in 2 separate doses and completed a 7-day course of intravenous methylprednisolone at 1 gm per day. He had near complete resolution of symptoms and his visual acuity improved to 20/25 bilaterally, with resolution of optic nerve edema. He was discharged home on a 4-week steroid taper and oral acetazolamide.

Readmission

Patient was readmitted 1 week later for fever, meningismus, and worsening pain with extra-ocular movements. Symptoms started during the steroid taper at home. LP was negative for infection and remarkable for a CSF opening pressure of 26 cm H2O with 59 WBC/mm3 and 46% neutrophils. Repeat MRI of brain and cervical spine showed decreased demyelinating lesions in brain and a normal cervical spine. Serum MOG IgG antibody titers had decreased to 1:10.

Patient received a 5-day course of intravenous methylprednisolone followed by a slow steroid taper. Acetazolamide was continued. Gabapentin was added for persistent extraocular movements, which helped decrease the pain.

Discharge and Outpatient Follow up

After discharge, the patient underwent thyroidectomy and radiotherapy for persistent cancer cells in the surgical thyroid bed. He was on monthly IVIG for 6 months with plans to start mycophenolate mofetil therapy.

He is currently doing well on outpatient follow-up 1 year after thyroidectomy.

Discussion/Conclusion

MOGAD is a demyelinating disease of the CNS, it's most common manifestation is optic neuritis.[3] This can present as various degrees of vision loss and is almost always associated with pain with extraocular movements.[4] Meningismus due to aseptic meningitis has also been described in inflammatory demyelinating CNS diseases like MOGAD..[5] Increased intracranial pressure has also been documented as a feature of MOGAD in several case reports as well as with other demyelinating diseases such as Multiple Sclerosis.[6,7] The postulated mechanism of action is neuroinflammation-mediated disruption of the CSF barrier, leading to increased CSF production and

reduced absorption, with subsequent increase in the intracranial pressure.[6]

According to the latest diagnostic criteria proposed by the International MOGAD Panel[8] our patient fulfilled all required features for diagnosis: 1. A core clinical demyelinating event (optic neuritis), 2. low positive MOG-IgG titers with AQP4-IgG seronegative and multiple supratentorial T2 hyperintense lesions with bilateral optic nerve involvement, and 3. Exclusion of multiple sclerosis and other diagnosis better explaining the patient's symptoms.

An association between MOGAD and certain neoplasm (T-cell lymphoma, lung, and colon) has been mainly reported in older adults.[2] In younger adults and adolescents, MOGAD's association with ovarian teratoma staining positive for MOG-IgG has been described.[9] Thyroid carcinoma has been previously described in association with NMOSD.[10] This case report would add to the expanding body of literature focused on the association between demyelinating disorders and cancer.

The early recognition of MOGAD is important since it prompts aggressive and emergent treatment to avoid the development of permanent neurologic sequelae. Close follow up after treatment for a first attack of MOGAD is crucial, since 50 to 60% of patients can relapse and experience further attacks.[11]

It is possible that our patient's demyelinating disease and his thyroid carcinoma were related, however, recent systematic reviews do not support routine screening for cancer in patients affected with MOGAD.[2] Further studies are needed to clarify this relationship.

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Ethical Approval

The authors have received written consent from the patient's family to publish this case report.

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