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Myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD): a pediatric case report

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ABSTRACT

Recently, the disease associated with antibodies against the myelin glycoprotein of oligodendrocytes was described. It is characterized by clinical manifestations such as optic neuritis, transverse myelitis, and acute disseminated encephalomyelitis, among others. It occurs in children and young adults.

Diagnosis is based on clinical findings and neurological imaging and is confirmed when antibodies against the myelin glycoprotein of oligodendrocytes are found in the blood. Given the pathology's severity, this study's result should not delay treatment.

We present the case of a 15-year-old patient who was admitted with paresis of the upper limbs and paralysis of the lower limbs associated with acute urinary retention. During his hospitalization, the disease was suspected, and he was treated with good neurological evolution. Subsequently, the laboratory results confirmed the disease.

Keywords: *myelin-oligodendrocyte glycoprotein; antibodies; demyelinating diseases; diagnostic techniques and procedures.*

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INTRODUCTION

Acquired demyelinating syndromes (ADS) in the pediatric age are those involving a neurological deficit associated with evidence of central nervous system (CNS) demyelination in children.[1] They include multiple sclerosis, neuromyelitis optica spectrum disorders associated with antibodies against aquaporin 4 and myelin glycoprotein oligodendrocyte antibody disease (MOGAD).

Serum antibodies directed against myelin oligodendrocyte glycoprotein (MOG) are found in patients with acquired disease.[2] These antibodies bind to MOG, damaging myelin sheaths and causing demyelination through antibody-dependent cellular cytotoxicity or complement activation.[3]

ADS shares signs, symptoms, and radiological images, but there are new autoantibodies that can help diagnose them. Differential diagnosis is essential since some infectious, genetic, metabolic, or rheumatologic diseases can mimic an ADS.[1]

An expert panel proposed criteria for diagnosing MOGAD, which include a demyelinating clinical event, positive MOG-IgG test, magnetic resonance imaging (MRI) features, and exclusion of better diagnoses, including multiple sclerosis.[2]

Early suspicion allows treatment and avoids irreversible neurological damage.

CLINICAL CASE

A 15-year-old male patient, previously healthy with a viral respiratory infection 15 days earlier, was admitted hemodynamically compensated, with 72 hours of upper limb paresis, lower limb paraplegia, and urinary retention, with normal cranial nerve examination.

Laboratory studies showed leukocytosis; hepatogram, renal function, coagulogram, FAN C3, C4, and thyroid profile were normal, and a nasopharyngeal secretion virological (NSVF) was positive for adenovirus (ADV). Chest X-ray, computed axial tomography (CT) of the brain and complete spine with contrast, echocardiogram, and Doppler of the neck vessels were also normal. For suspicion of Guillain-Barré syndrome, intravenous (IV) gammaglobulin 2 g/kg was given to the patient in five days, achieving greater strength in the upper limbs and mobility of the feet, but urinary retention persisted, and constipation was added.

Virological cultures and antiganglioside antibodies were negative in the cerebrospinal fluid (CSF). The studies were completed with an MRI of the brain, lumbosacral spine, and electromyogram, which were normal with negative serologies, anti-varicella IgG antibodies, rubella IgG antibodies were both positive; varicella IgM and IgM for herpes, VDRL, enterovirus, cytomegalovirus, herpes simplex virus type 1 and type 2, Epstein-Barr virus (EBV), mycoplasma, COVID-19, parasitological and skin test for tuberculosis, all negative. Antiphospholipid syndrome, rheumatoid arthritis, vasculitis, and systemic lupus erythematosus were ruled out.

On day 14, blurred vision and diplopia with nystagmus appeared, and repeated MRI of the brain and dorsal cervical spine with contrast plus angioresonance reported multiple hyperintense lesions in FLAIR visible in the posterior protuberance (in the anterior margin of the fourth ventricle) and periventricular in its left posterolateral margin, in the left middle cerebellar peduncle, hyperintense focal lesion in the posterior arm of the left-sided internal capsule, also in the left-sided corpus callosum, isolated hyperintense lesions in the juxta/subcortical white matter at the bifrontal level and normal angioresonance (*Figure 1*).

Hyperintense focal lesion of the short segment in left posterolateral topography at C3 level (*Figure 2*).

Due to lesions compatible with demyelinating disease, detection of anti-aquaporin 4, anti-MOG, and anti-oligoclonal bands antibodies in blood and CSF was performed. He was started on methylprednisolone 1 g/day IV in 5 days, then methylprednisone 1 mg/kg/day, calcium carbonate, and vitamin D.

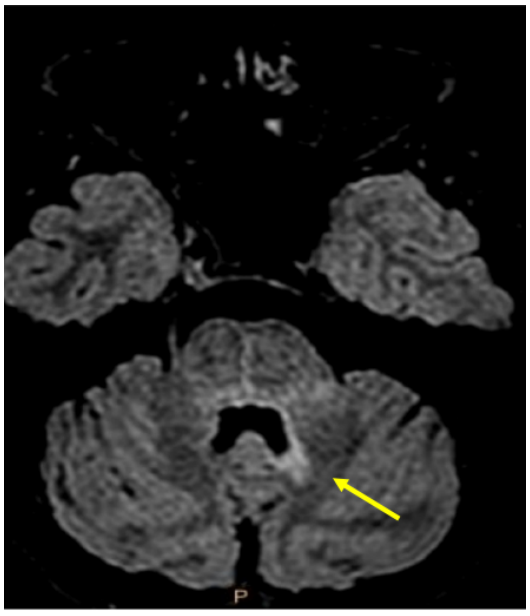
The patient tested positive for anti-MOG antibodies one week after receiving gamma globulins, showed good neurological evolution, and was discharged from the hospital with ambulatory controls.

DISCUSSION

MOGAD is a new entity in medicine. Its incidence is 1.6 to 3.4 per million people per year, and its prevalence is estimated at 20 per million.[2] It may be recurrent in approximately 35% of cases,[3] or have a monophasic course in up to 80% of the cases, as documented in a Canadian study.[4]

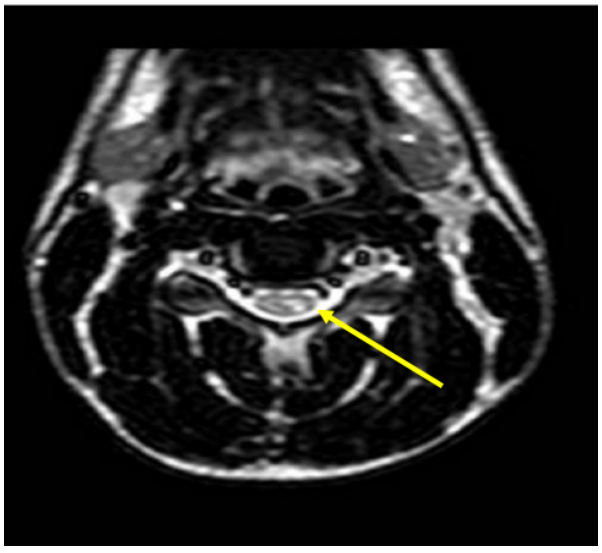
No specific pathogen has been identified so far.[3] Mariotto et al. describe that 45% of the patients presented prodromes or previous

Figure 1. Demyelinating lesions in brain magnetic resonance imaging



3D FLAIR axial slice, hyperintense lesion in the topography of the posterior pons at the anterior margin of the floor of the fourth ventricle.

Figure 2. MRI of cervical-dorsal spine



A cross section in T2 sequence at the C3 level, showing a hyperintense focal lesion of the short segment in left posterolateral topography.

infectious processes, such as gastrointestinal and respiratory tract infections and dental infections.[4] Cases related to herpesvirus type 1-6, cytomegalovirus and EBV have been described.

Our patient had a viral respiratory syndrome 15 days before illness, but ADV was rescued in the VSNF, and EBV was investigated with positive IgG and negative IgM and viral load.

Testing should be performed before the administration of corticosteroids, immunoglobulins, or apheresis because these therapies may reduce the detection of serum IgG-MOG concentration.[2] In our case, despite receiving IV immunoglobulin, he tested positive

for anti-MOG antibodies.

Optic neuritis (ON) is often bilateral (30-50%) and is associated with optic disc edema (86%); it responds well to corticosteroid treatment.[3] It is the most frequent presenting phenotype.[4]

Visual sequelae have been described in up to 80% of cases.[5] Our patient manifested blurred vision and underwent fundus examination, visual acuity measurement, and optical coherence tomography, which were found to be uneventful; after treatment, he presented normal vision.

Acute disseminated encephalomyelitis is the most common initial manifestation in children under 11 years of age (more than 50%).[3] Symptoms include drowsiness, speech disturbance, and focal neurological signs. Our patient did not suffer from somnolence or speech disturbance but had focal neurological signs.

About 30% of adults with MOGAD will present with transverse myelitis (TM). Symptoms include weakness that may result in paraparesis or quadriparesis and sensory loss below the level of the lesion with sensory level through the trunk, prominent bladder (urinary retention requiring catheterization), and bowel involvement.[3] Our case presented with signs of MT associated with lower limb paraplegia, an unusual presentation in pediatrics. He had a good neurological evolution after treatment.

Isolated brainstem or cerebellar syndromes are not a common presentation of MOGAD. Symptoms can range from diplopia to ataxia and depend on the infratentorial region affected.[3] Our patient added diplopia and nystagmus; after receiving IV corticosteroids, vision normalized.

The MRI for NO showed longitudinal affectation of the optic nerve, perineural optic sheath enhancement, and optic disc edema. Extensive longitudinal lesions, cones, and central cord lesions, or H signs, are observed in MT. In the brain, multiple T2 hyperintense lesions in supratentorial (ill-defined borders) and infratentorial white matter, involvement of deep gray matter, ill-defined T2 hyperintensities involving the pons, middle cerebellar peduncle or medulla oblongata, and cerebral cortical lesion with or without underlying leptomeningeal enhancement.[2] More than half of the patients with spinal cord lesions have short lesions and less than three vertebral segments.[3] It agrees with our patient, who presented demyelinating lesions in the brain and also in the spinal cord.

The first line treatment is IV methylprednisolone 30 mg/kg/day, maximum 1 g/day for 3 to 5 days. If there is no satisfactory response to IV corticosteroids, the following can be evaluated: treatment with IV immunoglobulins 2 g/kg spread over 2 to 5 days or plasma exchange (5-7 exchanges in 2 weeks). In the recurrent presentation, current recommendations are to initiate immunomodulatory treatment with azathioprine, mycophenolate mofetil, rituximab (anti-CD20), or periodic IV immunoglobulins.[1]

We assumed that our patient had Guillain-Barré syndrome, so he received IV immunoglobulin with slight improvement, then added other symptoms and neurological images compatible with demyelinating disease and received IV corticosteroids with good response.

Relapses often occur after tapering or discontinuation of oral steroid medication.[3] The patient has fully recovered, has a normal physical and neurological exam, and is off corticosteroids.

In conclusion, our patient met the criteria proposed by the panel and received treatment with corticosteroids and immunoglobulins with good evolution. We did not find information on the initial manifestation of lower limb paraplegia in pediatrics, nor related to respiratory symptoms due to ADV. Our case could help us to recognize other forms of presentation of this disease, achieving an early diagnosis and timely treatment to avoid neurological sequelae that could affect the patient's quality of life. ■

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