ORIGINAL RESEARCH PAPER

Paediatrics

A CASE REPORT OF PEDIATRIC MOG-ANTIBODY DISEASE WITH BILATERAL OPTIC NEURITIS

KEY WORDS: MOG antibody, Optic neuritis, Methylprednisolone

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ABSTRACT

MOG – Antibody disease is an inflammatory demyelinating condition of the CNS characterized by a monophasic or relapsing course of neurological dysfunction which does not meet the typical criteria for multiple sclerosis or other known neuro inflammatory conditions and occurs in presence of serum MOG antibodies using specific cell based assays. In pediatric patients MOG antibodies are detected in range of relapsing phenotypes including relapsing inflammatory optic neuritis (RION), acute disseminated encephalomyelitis followed by optic neuritis (ADEM – ON), brain stem demyelination and aquaporin P4 antibody negative neuromyelitis optica spectrum disorder (AQP4-Ab negative NMOSD).MOG positive optic neuritis is frequently bilateral and associated with optic nerve head swelling.It is associated with neurological diseases like Multiple Sclerosis, ADEM or Transverse Myelitis.MOG antibody IgG is detected in serum by indirect fluorescence test.IV Methylprednisolone is the treatment of choice, if it fails to improve vision or if optic neuritis is recurring, then a combination of plasma exchange and IV Methylprednisolone should be considered.Long term immunosuppressants used for Prevention include corticosteroids, azathioprine, mycophenolate mofetil and rituximab.The optimal preventive therapy has yet to be determined.Once the disease has been diagnosed, uncertainty remains over the best treatment approach and clinical trials for the pharmacological management of MOG-antibody optic neuritis are still needed.

INTRODUCTION

MOG – Antibody disease is an inflammatory demyelinating condition of the CNS characterized by a monophasic or relapsing course of neurological dysfunction which does not meet the typical criteria for multiple sclerosis or other known neuro inflammatory conditions and occurs in presence of serum MOG antibodies using specific cell based assays. Myelin oligodendrocyte glycoprotein (MOG) is glycoprotein present on the myelin surface and found exclusively in the central nervous system. In pediatric patients MOG antibodies are detected in range of relapsing phenotypes including relapsing inflammatory optic neuritis (RION), acute disseminated encephalomyelitis followed by optic neuritis (ADEM – ON), brain stem demyelination and aquaporin P4 antibody negative neuromyelitis optica spectrum disorder (AQP4-Ab negative NMOSD).It acts as a cellular adhesive molecule and is a regulator of oligodendrocyte, microtubule stability and mediates the complement cascade. The most common presenting feature is optic neuritis (ON) occurring in 54– 61% of patients followed by myelitis or ADEM.

MOG positive optic neuritis is frequently bilateral and associated with optic nerve head swelling. Incidence of MOG antibodies is 0.31 per 1,00,000 children. MOG-IgG associated optic neuritis is slightly more common in females (57%), with no ethnic predilection and is frequently bilateral.

CASE DETAILS

A previously healthy 6-year-old female child presented with sudden loss of vision in both eyes. Her past medical and family histories were unremarkable. No preceding infection was noted.

Ophthalmologic examinations revealed bilateral blurring of disc margin with tortuous veins with possibility of papilloedema or optic neuritis. Patient was referred to tertiary care hospital for further management. On examination patient was vitally stable with normal general examination. CNS Examination revealed normal higher functions, sensory and motor Function and no signs of meningeal irritation. On cranial nerve examination, second cranial nerve abnormalities were present. Patient had B/L perception of light, normal direct and indirect light reflex, no finger counting, and absent menace reflex. Other cranial nerve examination and rest systemic examination was normal.

Routine investigations were sent as per protocol which were normal. Work-up for TB was negative. Covid serological tests were negative. CSF routine examination and culture was normal. MRI Brain with orbit showed bilateral intraorbital part of optic nerves bulky and hyperintense suggesting possibility of optic neuritis. To find out cause of optic neuritis, Anti-NMO, Anti-ANA and Serum anti MOG IgG antibodies were sent of which Anti-NMO and Anti-ANA were negative but serum Anti-MOG IgG antibodies were positive by indirect immunofluorescence method. This test detects IgG antibodies against MOG using transfected Human Embryonic Kidney 2 cells as a substrate at a dilution of 1:10. She was diagnosed with MOG antibody disease with bilateral optic neuritis and treated with a course of pulse therapy of methylprednisolone for 5 days followed by a gradual tapering dose of oral prednisolone over a period of 1 month. Her vision improved after IV methylprednisolone and discharged after 5 days. Perimetry report is suggestive of right eye rim scotoma and left eye superior and inferior isolated scotomas.

She responded well to IV MPSS and there was no relapse with tapering prednisolone. Patient was called for regular follow up in pediatric, pediatric neurology and Ophthalmology OPD for 6 months and has no relapse till now with normal neurological examination.

Figure 1: MRI BRAIN WITH ORBITS- PLAIN AND CONTRAST T2WI IMAGE IN HORIZONTAL SECTION -

showing bulky and heterogenous hyperintensity in optic nerve.

Right optic nerve measures 4.5mm and Left optic nerve measures 4mm.

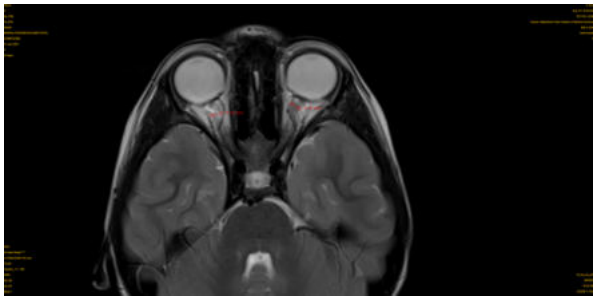
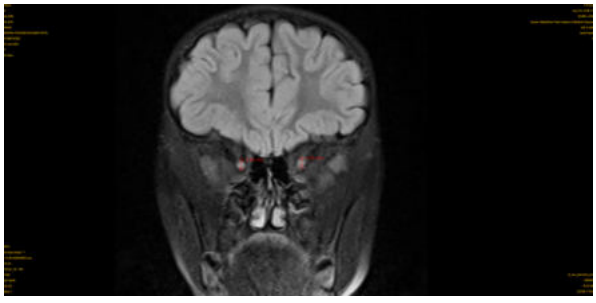


Figure 2: FLAIR IMAGE IN CORONAL SECTION - showing bulky and heterogenous hyperintensity in optic nerve.



DISCUSSION

Serum autoantibodies against MOG identify a cohort of patients with a strong predilection for isolated and recurrent optic neuritis. Median age of onset is in early to mid-thirties, while in this case it is first decade. The most common presenting feature is optic neuritis, occurring in 54-61% of patients same as this case. Onset of visual loss in usually severe (mean: count fingers vision), bilateral and acute or subacute which may be associated with pain (86%). On fundus examination there is moderate to severe disc edema. It is associated with neurological diseases like Multiple Sclerosis, ADEM or Transverse Myelitis. Common MRI findings include longitudinally extensive optic nerve lesions (80%), optic nerve oedema and perineural enhancement (50%), usually sparing chiasma and optic tracts. In children, bilateral thalamic lesions at onset are frequent and can be found in 60% of patients, which is not seen in this case. CSF pleocytosis occurs in 44-85% of patients and is more common in children and positive oligoclonal bands seen in 6-17% of patients and CSF protein is raised in around a one third of cases. In this case CSF investigations were normal.

MOG-IgG optic neuritis is frequently steroid responsive and steroid dependent. Although severe visual loss has been reported which is due to repeated attacks of optic neuritis, the risk of visual impairment from single event of optic neuritis is low. MOG antibody IgG is detected in serum by indirect fluorescence test in most of cases as seen in this case. MOG antibody titers have been found to be higher in relapse than in remission. A decreasing titer is usually found in monophasic disease course and conversion to antibody negativity, which has been shown to occur within around 8-36 months from an acute event, has been associated with no further relapses. However, following a negative result, antibodies can become positive again, even after a few years. IV Methylprednisolone is the treatment of choice, if it fails to improve vision or if optic neuritis is recurring, then a combination of plasma exchange and IV Methylprednisolone should be considered. Long term immunosuppressants used to prevent include corticosteroids, azathioprine, mycophenolate mofetil and rituximab. The optimal preventive therapy has yet to be determined. It frequently recurs ,80% patients have 2 or more attacks over a median time of 2.9 years. A relapsing course has been reported in 44-83% of patients and more commonly involves the optic nerve, but in this case, there is no relapse is seen till now. Residual disability develops in 50-80% of patients. In this case perimetry report after 4 week of illness suggests rim scotoma in right eye and superior + inferior isolate scotoma in left eye, and best corrected visual acuity of 6/9 in both eyes.

CONCLUSION

Pediatric bilateral optic neuritis is associated with high MOG-antibodies titers. Despite severe loss of vision, majority of patients shows distinct recovery after IV Methylprednisolone. The risk of evolving Multiple sclerosis in children is probably less than adults in, but pediatric Optic Neuritis is more likely to be an initial manifestation of ADEM. Steroids hasten visual recovery, but they do not change visual outcome. Once the disease has been diagnosed, uncertainty remains over the best treatment approach and clinical trials for the pharmacological management of MOG-antibody optic neuritis are still needed.

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