Unusual presentation of isolated right abducens nerve palsy followed by elevated intracranial pressure and pendular nystagmus in the case of myelin oligodendrocyte glycoprotein antibody-associated disease

Chen Huey Ng, MRCP, Weng Yuen Wong, MRCP, Yi Jie Wong, MRCP, Chun Fai Cheah, MRCP

Hospital Raja Permaisuri Bainun, Ipoh, Perak, Malaysia

SUMMARY

We describe the case of a female patient with underlying acute lymphoblastic leukaemia in remission who initially presented with isolated right abducens nerve palsy. A month later, she further deteriorated with development of myelopathy and brainstem syndrome, which required ventilatory support due to respiratory failure. A lumbar puncture was performed, revealing evidence of elevated intracranial pressure. Subsequently, she presented with an unusual clinical symptom of pendular nystagmus while on a ventilator. She received treatment with intravenous methylprednisolone, intravenous immunoglobulin and plasma exchange for her myelopathy and brainstem syndrome. As a result, she was successfully weaned off the ventilator, and experienced full improvement in her upper limb functions. Nevertheless, she had remaining bilateral visual impairment and paraplegia. Furthermore, the pendular nystagmus resolved following treatment with gabapentin and memantine.

INTRODUCTION

Myelin oligodendrocyte glycoprotein (MOG) is a glycoprotein expressed selectively in oligodendrocytes, which are glial cells of the central nervous system.[1] Serum antibodies directed against MOG are found in patients with acquired central nervous system demyelinating syndrome that are distinct from multiple sclerosis and aquaporin-4-seropositive neuromyelitis optica spectrum disorder, thus requiring a different treatment management.[2]

CASE PRESENTATION

A 38-year-old female with underlying migraine and acute lymphoblastic leukaemia that was diagnosed since 1996, and completed chemotherapy in 1998, had her last haematology follow-up 5 years ago. Subsequently, she first presented at our department with sudden onset diplopia, that worsened when gazing to the right. Five days later, she started to have occipital headache, which was throbbing in nature and radiated to the frontal region having pain score of 6/10. Initial neurological examination revealed right abducens nerve palsy without cerebellar signs. The other cranial nerves were grossly intact. Fundoscopy finding showed normal visual acuity with no papilloedema. Power for all limbs was full (MRC scale 5/5) with normal tone, reflexes, and sensation. A non-contrast enhanced CT brain at that time was normal. She was given paracetamol and subsequently headache was improving. She was discharged home and early appointment for contrast enhanced CT brain has been arranged for her. However, she defaulted contrast enhanced CT brain appointment. One month later, she visited the emergency department due to acute urinary retention. Her right abducens nerve palsy persisted. Visual acuity and relative afferent pupillary defects were negative, and there was no nystagmus. She also had weakness of bilateral lower limbs with sensory level at T10. She was admitted to the ward and subsequently developed sensory level at T4, upper limbs weakness and respiratory failure. Post intubation, patient required high ventilator support. Magnetic resonance imaging of brain and spine showed patchy areas of T2WI/FLAIR hyperintensities in parasagittal bifrontal cortex, bilateral periventricular and left peritrigonal region, corpus callosum, bilateral medial temporal lobes including the hippocampi, bilateral cerebral peduncle, visualised bilateral proximal optic radiations, midbrain, and pons (worse on right), vermis, bilateral cerebellar lobes and bilateral cerebellar peduncles (Figure 1). A few of these lesions showed corresponding hypointense signal on T1WI. There were extensive patchy ill-defined T2WI hyperintensities (Figure 2) in the medulla oblongata and along the spinal cord, causing cord expansion at the cervical, lower thoracic cord and the conus medullaris (Figure 3). These spinal cord lesions also showed enhancement post contrast.

Lumbar puncture was performed, revealing a high opening pressure of > 50 cm H_20. Cerebrospinal fluid (CSF) results showed a protein level of 659 mg/L (normal range: 150-400 mg/L), glucose level of 2.8 mmol/L (normal range: 2.2-3.9 mmol/L) and having no cell count. CSF results showed no evidence of bacterial or viral meningitis and cytospin showed no malignant cells. The serum aquaporin-4 receptor antibody test was negative. Serum anti MOG antibody was detected by Euroimmun Indirect Immunofluorescence Test. Subsequently, she was given IV methylprednisolone 1 g OD for 5 days, intravenous immunoglobulin 0.4 g/kg for 5 days with plasma exchange for five cycles. After a month she was able to wean off ventilator and regain full strength in her bilateral upper limbs, with residual weakness in her bilateral lower limbs. She also developed pendular nystagmus while

This article was accepted: 07 February 2024
Corresponding Author: Ng Chen Huey
Email: zoeychuey@gmail.com

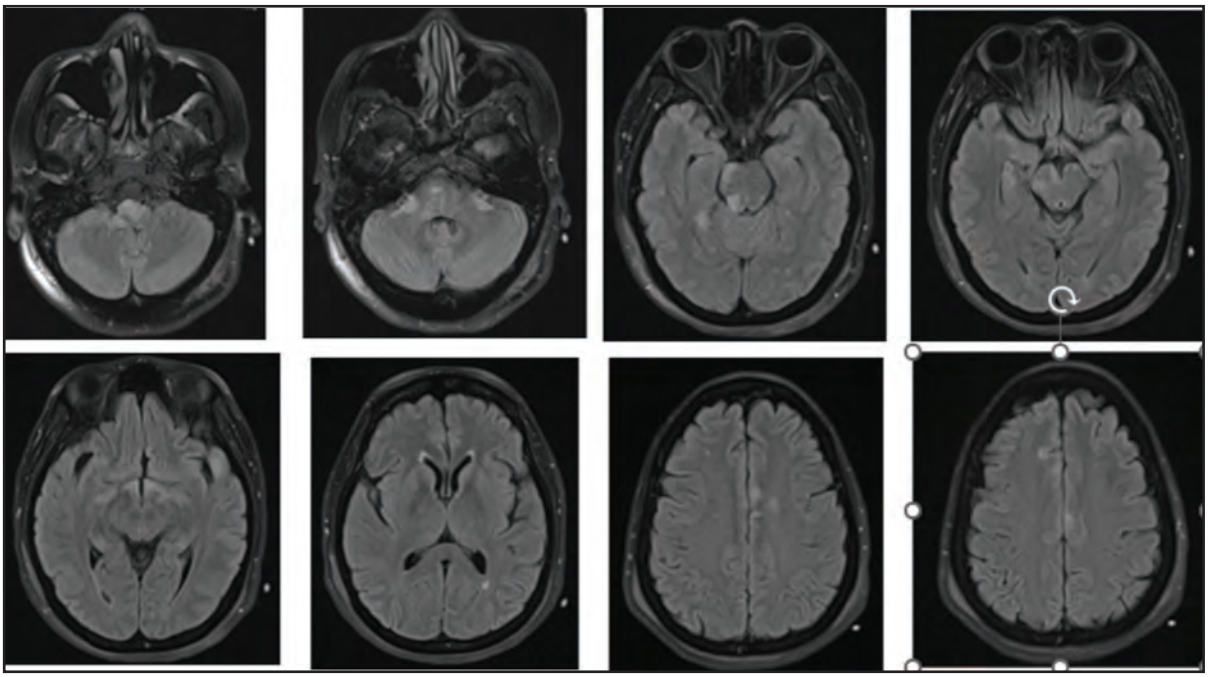

Fig. 1: Axial FLAIR brain images showed patchy hyperintensities at medulla (A), bilateral cerebellar peduncles (B), pons (C), midbrain (D), third ventricle and hypothalamus (E), peritrigonal region (F), parasagittal bifrontal cortex (G) & (H)

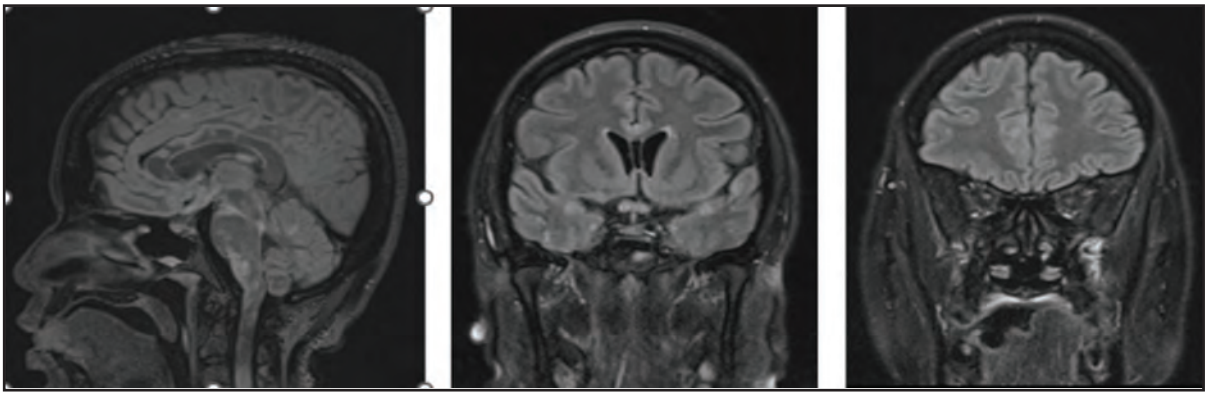

Fig. 2: Sagittal FLAIR brain images showed patchy hyperintensities at corpus callosum (A), bilateral medial temporal lobes (B), frontal region (C)

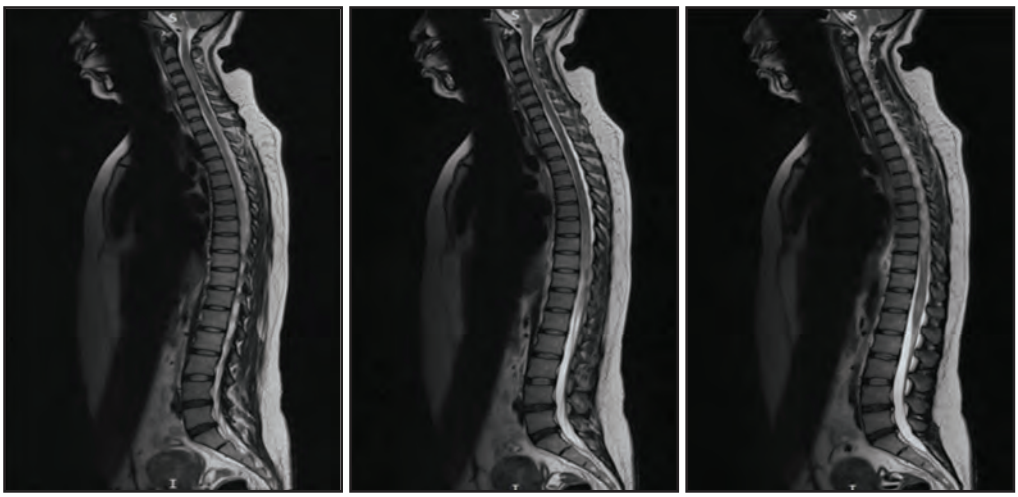

Fig. 3: Sagittal T2WI spine images showed longitudinal hyperintensities and cord expansion at cervical cord (A), lower thoracic cord (B), conus medullaris (C)

on the ventilator, which did not respond to gabapentin treatment but resolved after given memantine for a month. She was subsequently put on oral prednisolone as maintenance therapy.

DISCUSSION

Our patient presented with subacute onset of brainstem syndrome and myelopathy. Our initial differential diagnosis includes demyelinating disease, haematological malignancy relapse, or central nervous system infection. In her case, a full blood count shows normal lymphocyte counts, and no blast cells are detected in a full blood picture. Cytospin of cerebrospinal fluid showed no malignant cells, thus relapse of haematological malignancy in the central nervous system was excluded. Central nervous system infection was also unlikely, as the infective screening of the cerebrospinal fluid was negative. Subsequently, MOG antibodies were detected in her serum via a fixed cell-based assay. Hence, in combination with the clinical features, the diagnosis of myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD) was made. The diagnosis was guided by the proposed criteria set by the International MOGAD Panel.[3]

There were a few interesting features that we detected in our patient with MOGAD. Firstly, our patient had an isolated right abducens nerve palsy without signs of raised intracranial pressure. We suspect that the initial isolated right abducens nerve palsy might be due to a small lesion at the abducens nerve region in the pons. Brainstem involvement in MOGAD is common, although isolated nerve palsies are not common as due to the typical involvement of diffuse lesions in medulla, pons, or midbrain in MOGAD.[4] This was evidenced by a case series of MOGAD involving cranial neuropathies reviewed by Du et al. In their study, the majority of their patients had multiple cranial nerve involvement.[5] Isolated abducens nerve palsy as the first presenting sign of multiple sclerosis had been reported[6] wherein short peripheral lesion predominates in multiple sclerosis. However, there is no case report regarding isolated cranial nerve involvement in MOGAD noted so far.

Secondly, our patient developed acquired pendular nystagmus. This occurrence has not been reported in the case of MOGAD. Nonetheless, a case of acquired pendular nystagmus secondary to multiple sclerosis and ocular palatal tremor has been reported.[7] We postulated that the acquired pendular nystagmus of our patient was due to instability of neural integrator which are distributed across the brainstem and cerebellum especially at the paramedian tracts, dorsal pontine tegmentum in the brainstem and the anterolateral pons and midbrain.[8]

On the other hand, our patient exhibited an elevated opening pressure during lumbar puncture, yet there was no evidence of central nervous system infection. We concluded that the increase in intracranial pressure was attributable to MOGAD, given its temporal association with the detection of MOG antibodies in the patient. Elevated intracranial pressure is an uncommon presentation of MOGAD. Chaudhuri et al[9] reported a MOGAD case with relapsing remitting course, each time presenting solely with symptoms of raised intracranial pressure, without developing any typical clinical manifestations of MOGAD. In contrast, our patient developed elevated intracranial pressure alongside brainstem syndrome and myelopathy, which aided in the diagnosis.

She was administered a high dose steroid, intravenous immunoglobulin, and plasma exchange after the diagnosis of MOGAD was confirmed, which led to partial neurological improvement. She was able to sit up and carried basic daily activities on her own. The pendular nystagmus showed reduction upon taking gabapentin 600 mg TDS, but it fully resolved only upon the use of memantine 10 mg bd. Both gabapentin and memantine have been reported as effective in decreasing acquired pendular nystagmus and enhancing functional visual outcomes.[10]

CONCLUSION

In conclusion, our patient presented with subacute brainstem syndrome and myelopathy. After malignancy and infection were excluded, coupled with serum MOG antibody detection, she is confirmed to have MOGAD. Along with common presentations such as brainstem syndrome and myelopathy, this case broadens the clinical spectrum to include unusual presentations such as isolated abducens nerve palsy, elevated intracranial pressure and pendular nystagmus.

REFERENCES

1. Sechi E, Cacciaguerra L, Chen JJ, Mariotto S, Fadda G, Dinoto A, et al. Myelin Oligodendrocyte Glycoprotein Antibody-Associated Disease (MOGAD): A Review of Clinical and MRI Features, Diagnosis, and Management. Front Neurol 2022; 13: 885218.
2. Pace S, Orrell M, Woodhall M, et al. Frequency of MOG-IgG in cerebrospinal fluid versus serum. J Neurol Neurosurg Psychiatry 2022; 93(3): 334-5.
3. Banwell B, Bennett JL, Marignier R, et al. Diagnosis of myelin oligodendrocyte glycoprotein antibody-associated disease: International MOGAD Panel proposed criteria. Lancet Neurol 2023; 22(3): 268-82.
4. Banks SA, Morris PP, Chen JJ, et al. Brainstem and Cerebellar Involvement in MOG-IgG Associated Disorder versus Aquaporin-4-IgG and MS. J Neurol Neurosurg Psychiatry 2021; 92(4): 384-90.
5. Du Y, Xiao L, Ding Z, Huang K, Xiao B, Feng L. MOGAD Involving Cranial Neuropathies: A Case Report and Review of Literature. Brain Sci 2022; 12(11).
6. Bet-Shlimon S, Etienne M. Isolated abducens palsy as the first presenting sign of multiple sclerosis. Case Rep Neurol 2016; 8(3): 272.
7. Kang S, Shaikh AG. Acquired pendular nystagmus. J Neurol Sci 2017; 375: 8.
8. Leigh RJ, Das VE, Oruganti P, Kramer PD. Experimental tests of a neural-network model for ocular oscillations caused by disease of central myelin. Exp Brain Res 2000;133(2): 189-97.
9. Chaudhuri JR, Bagul JJ, Swathi A, Singhal B Sen, Reddy NC, Vallam KK. Myelin oligodendrocyte glycoprotein antibody-associated disease presenting as intracranial hypertension: a case report. Neurol Neuroimmunol Neuroinflamm 2022; 9(6).
10. Nerrant E, Abouaf L, Pollet-Villard F, Vie A-L, Vukusic S, Berthiller J, et al. Gabapentin and memantine for treatment of acquired pendular nystagmus: effects on visual outcomes. J Neuroophthalmol 2020; 40(2): 198-206.