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Short communication

Chronic inflammatory demyelinating polyradiculoneuropathy associated with neuromyelitis optica spectrum disorder: A rare case report

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ABSTRACT

Introduction: Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) is a rare disease that targets the myelin sheath, while neuromyelitis optica spectrum disorder (NMOSD) with anti-aquaporin-4 antibodies (AQP4-Ab) affects astrocytes. We report a unique case of CIDP associated with NMOSD.

Case presentation: A 49-year-old woman presented to the emergency department with recurrent episodes of vertigo and blurred vision. Brain magnetic resonance imaging (MRI) with contrast eight months before admission showed Dawson's finger, and follow-up brain MRI showed a new hyperintense lesion. Visual evoked potential showed bilateral pre-chiasma lesions, and somatosensory evoked potential indicated lesions between the medulla and cerebral cortex. The patient tested positive for AQP4-Ab, and had ascending lower motor neuron weakness for the past 10 weeks. Electromyography revealed multiple demyelinating lesions suggestive of CIDP. The patient was intravenously administered corticosteroids, methotrexate, and azathioprine, resulting in clinical improvement.

Conclusion: CIDP associated with NMOSD is a rare occurrence. In our patient, a combination of corticosteroids and immunosuppressants was effective. The mechanism of combined demyelination of the central and peripheral nervous systems is still not fully understood, and further immunological and pathological studies are needed.

1. Introduction

Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) is a demyelinating disease of the peripheral nervous system that is caused by heterogeneous immune-mediated processes. The damaged myelin, or 'demyelinating' lesion, will result in weakness and sensory disturbance (Koike and Katsuno, 2020). Electron microscopic examination of sural nerve biopsy specimens suggests that macrophages recognize specific sites of myelinated fibers as the initial target of demyelination in this disease (Koike et al., 2018).

Neuromyelitis optica spectrum disorder (NMOSD), is an autoimmune disorder affecting neuroglia. NMOSD has a broad clinical manifestation, ranging from decreased visual acuity to scotoma. Presence of antibody targeting aquaporin-4 (AQP4-Ab) is highly specific for this disease (Huda et al., 2019).

Both are autoimmune diseases, leaving clinicians to wonder whether a connection exists between these conditions. CIDP and NMOSD are not commonly found in daily medical practice, making CIDP-related NMOSD cases even more difficult to find. Although several cases of CIDP and multiple sclerosis (MS), a disease closely related to NMOSD, have been reported in various publications (Ingwersen et al., 2022; Warabi et al., 2013; Sharma et al., 2008), only one case of CIDP-related NMOSD has been reported (Murthy and Hillen, 2019). In this paper, we report a unique case of CIDP associated with NMOSD that showed good recovery after treatment with pulse-dose corticosteroids.

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2. Case report

A 49-year-old woman was brought to the emergency department with severe acute-onset vertigo four days before admission. The patient's vertigo developed suddenly when watching television and was felt throughout the day. Subsequently, the patient experienced nausea, recurrent vomiting, hiccups, and blurry vision. Ten weeks before admission, the patient had progressive weakness in the lower and upper extremities. Weakness was initially felt in the toes and ascended to the lower extremities. With worsening weakness, the patient required a wheelchair for mobilization. As the disease progressed, the upper extremities were affected. Simultaneously, the patient also experienced a tingling sensation that ascended from the lower to the upper extremities. The weakness persisted until she presented to the emergency room.

One year prior to admission, the patient had recurrent episodes of vertigo. She also had weakness in the right extremities and blurry vision 8 months before admission, with complete remission after two weeks. Head computed tomography (CT) excluded ischemic and hemorrhagic stroke. Further investigation using brain magnetic resonance imaging (MRI) showed a multifocal paraventricular lesion (Dawson's finger), suggesting an autoimmune etiology (Fig. 1). She had similar symptoms of weakness in the extremities and tingling six weeks before admission, which was suspected to be an autoimmune disease, and was treated with methylprednisolone. The weakness in extremities improved significantly although the tingling sensation remained.

Visual acuities were recorded down to 1/60 for both eyes but neurological examination revealed normal ocular movements and no nystagmus. We also observed lower motor neuron weakness with a Medical Research Council (MRC) score of 3 throughout the left and right extremities and paresthesia in the glove and stocking distribution. The patient also had coordination disorder.

CT scan and lumbosacral radiography were then performed for screening and no abnormalities were observed. Since there was suspicion of peripheral lesion and blurry vision, we continued the investigation with a visual evoked potential that showed a bilateral prechiasmal lesion and somatosensory evoked potential, indicating a lesion between the medulla and cerebral cortex (Supplementary Table 1). Further examination with brain MRI revealed new hyperintense lesions in both paraventricular and brainstem compared to the previous MRI suggesting new active lesions (Fig. 2a). Although the patient's MRI findings were atypical as NMOSD, the recurrence of blurry vision and positive AQP4-Ab (Fig. 2b) led to a diagnosis of NMOSD, a spectrum of MS.

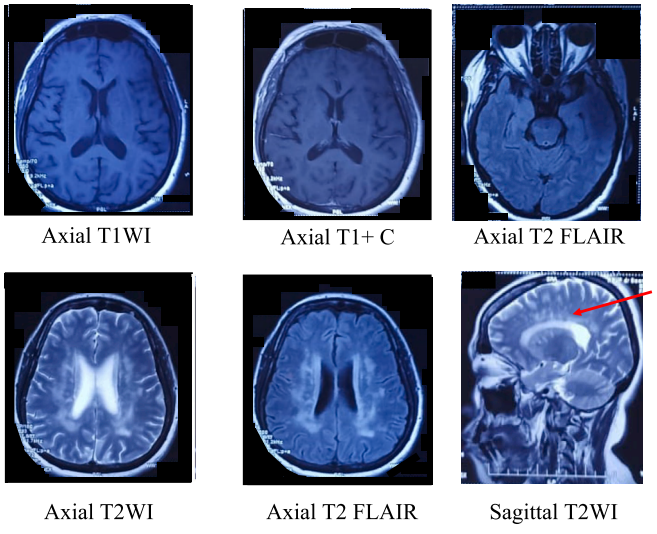

Fig. 1. Initial brain MRI with contrast showed multifocal paraventricular lesion, normal brainstem, and Dawson's finger (red arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

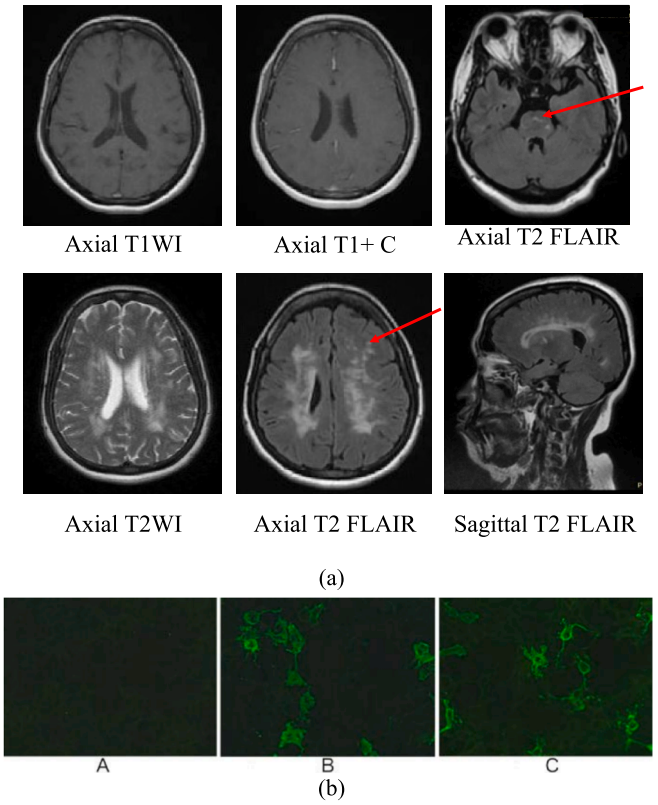

Fig. 2. (a) Follow-up brain MRI with contrast showed new active hyperintense lesions in both paraventricular and brainstem (red arrow), (b) Cell-based indirect immunofluorescence assay for AQP4-Ab detection: (A) negative control; (B) positive control; (C) patient serum.

Whole-spine MRI revealed no active lesions in the spinal cord. This result left the clinical manifestation of ascending weakness in question. We hypothesized the occurrence of a pathological process in the peripheral nerves. Electrolytes, serum creatinine, and complete blood count were all within normal ranges. Cerebrospinal fluid analysis showed albumino-cytological dissociation of an increasing protein (84 mg/dL; normal 15–40 mg/dL) without increasing number of cells (1/μL; normal 0–5/μL), which supported the diagnosis of CIDP. (Koike and Katsuno, 2020) We then performed nerve conduction study and observed reduced compound muscle action potentials of bilateral fibular nerve (1.2 mV and 1.4 mV in the left and right nerves, respectively; reference $>$ 2.5 mV), right median nerve (4.1 mV; reference $>$ 5 mV), and sensory demyelinating neuropathy of left sural nerve (5.5 ms; reference $<$ 4.0 ms) (Supplementary Table 2). The right fibular motor velocity (23 m/s; reference $>$ 40 m/s) and the left median motor velocity (23 m/s; reference $>$ 50 m/s) was also significantly reduced. We also observed prolonged F-wave latencies in the left and right fibular nerves (58 ms and 64 ms, respectively; reference $<$ 46 ms) and left and right median nerve (31 ms and 35 ms, respectively; reference $<$ 28 ms). This finding suggested a diagnosis of CIDP (Van den Bergh et al., 2021).

After diagnosis, pulse therapy with high-dose corticosteroids (1000 mg, q.1.d) was administered for 3 days. We observed a marked improvement in the extremities (MRC score of 4) after completion of three doses. Methotrexate (25 mg each week), azathioprine (50 mg t.i.d.), and prednisone (5 mg t.i.d) were administered as NMOSD disease-modifying therapy. Vertigo, nausea, and vomiting subsided, and after 7 days of hospitalization, the patient was discharged from our facility.

3. Discussion

The diagnosis of CIDP was made based on criteria from the European Academy of Neurology/Peripheral Nerve Society 2021 (Van den Bergh et al., 2021). Our patient had chronic progressive and recurrent weakness, and decreased sensation in the extremities, which met the typical clinical criteria of CIDP. Electrophysiological criteria were also met, including slowed conduction in two nerves (left median nerve and right fibular nerve) and prolonged F-waves in four nerves (bilateral fibular nerves and bilateral median nerves). A diagnosis of CIDP was made and the patient was treated with high-dose methylprednisolone. Corticosteroids are recommended by the Indonesian Neurological Association as the first-line treatment for CIDP. (Hakim et al., 2018) Methylprednisolone was administered at 1000 mg q.d. for 3 days. Corticosteroids suppressed the production of inflammatory mediators and increased circulatory T-regs, an anti-inflammatory cell. (Hughes et al., 2017) Our patient showed good clinical response and planned to receive two more doses at 1 month and 2 months after the initial dose, as suggested by the Indonesian guidelines. Several disease-modifying therapies, including alemtuzumab, ocrelizumab, and rituximab, are currently under investigation for the treatment of CIDP cases (Melzer and Meuth, 2014).

In this case, CIDP overlapped with NMOSD. Our patient had recurrent vertigo 8 months prior to admission. She also experienced weakness in her right extremities and blurry vision following the first episode of vertigo. Her brain MRI showed Dawson's finger, a pathognomonic finding in autoimmune disease of the central nervous system (Bradshaw and Houtchens, 2018). Another attack of vertigo months later, along with a new lesion on head MRI enabled the diagnosis of an autoimmune disease. The recurring symptom of blurry vision suggested NMOSD, a spectrum of MS, and we found positive AQP4-Ab. For patients positive for AQP4-Ab, there should be at least one core clinical characteristic of NMOSD, which in our case was optic neuritis manifesting as blurry vision (Wingerchuk et al., 2015). She then received methotrexate 25 mg each week, azathioprine 50 mg t.i.d., and prednisone 5 mg t.i.d. as disease-modifying therapy.

Overlapping CIDP and NMOSD cases are rare, and only one such case has been published thus far. Murthy and Hillen reported a case of NMOSD in a patient with CIDP. Unlike our patient, they reported a seronegative AQP4-Ab, with serial brain and spine MRI showing lesions in the medulla oblongata and optic nerve edema. Electrophysiological findings revealed decreased conduction velocity, reduced compound muscle action potentials, and prolonged F-response, typical of CIDP. The mechanism of combined demyelination of the central and peripheral nervous systems remains unclear, and further immunological and pathological studies are required.

In contrast to the patient in the study by Murthy and Hillen who was treated with oral steroids, IVIg, and mycophenolate mofetil, we started our patient on IV corticosteroids, methotrexate, and azathioprine (Murthy and Hillen, 2019). Both IVIg and IV corticosteroids are first-line treatments for CIDP. We chose corticosteroids over IVIg because corticosteroids can be accessed more easily and are more cost-effective. However, both the treatments resulted in good outcomes. According to the Indonesian Neurological Association, if the outcome of the first dose of IV corticosteroid is favorable, it can be continued with 1–2 g of corticosteroid/month for 2–3 months (Hakim et al., 2018).

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CRediT authorship contribution statement

Baarid Luqman Hamidi: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Funding acquisition, Data curation, Conceptualization. **Diah Kurnia Mirawati:** Writing – review & editing, Visualization, Resources, Methodology, Funding acquisition. **Rachmi Fauziah Rahayu:** Writing – review & editing, Visualization, Validation, Software, Resources, Investigation. **Hanindia Riani Prabaningtyas:** Conceptualization, Data curation, Investigation, Resources, Supervision, Validation. **Muhammad Hafizhan:** Writing – review & editing, Writing – original draft, Visualization, Software, Data curation. **Stefanus Erdana Putra:** Writing – review & editing, Writing – original draft, Visualization, Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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Ethical approval

To obtain information regarding this case, written informed consent was obtained from the patient, copies of which are available. This case report was also reviewed by The Health Research Ethics Committee of Dr. Moewardi General Hospital, and ethical approval was granted by ethical clearance number 382/III/HREC/2023.

Appendix A. Supplementary material

Supplementary material to this article can be found online at https://doi.org/10.1016/j.pmedr.2024.102702.

References

Bradshaw, M.J., Houtchens, M., 2018. Neurology board review: multiple sclerosis. Neurol. Rev.

Hakim, M., Gunadharma, S., Basuki, M., 2018. Pedoman Tatalaksana GBS, CIDP, MG, Imunoterapi. I. Perhimpunan Dokter Spesialis Saraf Indonesia, Jakarta.

Huda, S., Whittam, D., Bhojak, M., Chamberlain, J., Noonan, C., Jacob, A., 2019. Neuromyelitis optica spectrum disorders. Clin. Med. (Northfield IL) 19 (2), 169–176.

Hughes, R.A.C., Mehndiratta, M.M., Rajabally, Y.A., 2017. Corticosteroids for chronic inflammatory demyelinating polyradiculoneuropathy. Cochrane Database Syst. Rev. 2017 (11).

Ingwersen, J., Graf, J., Kluge, J., Weise, M., Dietrich, M., Lee, J.I., et al., 2022. CNS involvement in chronic inflammatory demyelinating polyneuropathy: subtle retinal changes in optical coherence tomography. Neurol. Neuroimmunol. Neuroinflamm. 9 (1), 1–8.

Koike, H., Katsuno, M., 2020. Pathophysiology of chronic inflammatory demyelinating polyneuropathy: insights into classification and therapeutic strategy. Neurol. Ther. [Internet] 9 (2), 213–227.

Koike, H., Nishi, R., Ikeda, S., Kawagashira, Y., Iijima, M., Katsuno, M., Sobue, G., 2018. Ultrastructural mechanisms of macrophage-induced demyelination in CIDP. Neurology 91 (23), 1051–1060.

Melzer, N., Meuth, S.G., 2014. Disease-modifying therapy in multiple sclerosis and chronic inflammatory demyelinating polyradiculoneuropathy: common and divergent current and future strategies. Clin. Exp. Immunol. 175 (3), 359–372.

Murthy, M., Hillen, M., 2019. First report of confirmed CIDP in a patient with neuromyelitis optica spectrum disorder (NMOSD). Neurology [Internet] 92 (15). https://www.embase.com/search/results?subaction=viewrecord&id=L629260242&from=export.

Sharma, K.R., Saadia, D., Facca, A.G., Bhatia, R., Ayyar, D.R., Sheremata, W., 2008. Chronic inflammatory demyelinating polyradiculoneuropathy associated with multiple sclerosis. J. Clin. Neuromuscul. Dis. 9 (4), 385–396.

Van den Bergh, P.Y.K., van Doorn, P.A., Hadden, R.D.M., Avau, B., Vankrunkelsven, P., Allen, J.A., Attarian, S., et al., 2021. European academy of neurology/peripheral nerve society guideline on diagnosis and treatment of chronic inflammatory

demyelinating polyradiculoneuropathy: report of a joint task force-second revision. Eur. J. Neurol. 28 (11), 3556–3583.
Warabi, Y., Yamazaki, M., Shimizu, T., Nagao, M., 2013. Abnormal nerve conduction study findings indicating the existence of peripheral neuropathy in multiple sclerosis and neuromyelitis optica. Biomed. Res. Int. 2013.
Wingerchuk, D.M., Banwell, B., Bennett, J.L., Cabre, P., Carroll, W., Chitnis, T., et al., 2015. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. Neurology 85 (2), 177–189.