Case Report

Neuromyelitis optica spectrum disorders accompanying subarachnoid hemorrhage and reversible white matter lesions

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Abstract

A 48 year old man was admitted to our hospital because of intractable hiccup and nausea (IHN) and orthostatic hypotension. Brain MRI findings showed a dorsal medullary lesion. Respiratory failure occurred and he underwent tracheotomy and mechanical ventilation, when MRI showed subarachnoid hemorrhage (SAH) in addition to enlarged medullary lesions. Serum anti-aquaporin 4 (AQP4) antibody was positive and the cerebrospinal fluid was bloody. We diagnosed Neuromyelitis optica spectrum diorders (NMOSDs) complicating SAH. He was treated with steroid. Though extensive white matter lesions occurred transiently, he discharged from the hospital on the 52nd day, when he became able to walk with the use of the walker. We speculate that the subarachnoid hemorrhage and transient white matter lesions were associated with **vascular damages** associated with the NMOSDs.

Introduction

Neuromyelitis optica (NMO) is a rare inflammatory and demyelinating autoimmune disorder of the central nervous system (CNS) characterized by recurrent attacks of optic neuritis and longitudinally extensive transverse myelitis. We report a case of NMO spectrum disorder (NMOSDs) preceded by intractable hiccup and nausea (IHN) accompanied with subarachnoid hemorrhage (SAH) and reversible leukoencephalopathy. This is the first case of SAH accompanying NMOSDs, and provides perspective on the etiology of NMOSDs.

Case report

A 48 year old man was admitted to our hospital because of the IHN and orthostatic hypotension on January 2009. MRI revealed medullary T2W hyperintensity lesions. He was treated with argatroban for brainstem infarction at the Department of Neurosugery, but the symptoms worsened. He was intubated and assisted with mechanical ventilation because of respiratory failure. Bilateral pneumonia and hypernatremia occurred. The symptoms were

atypical to ischemic stroke, so the patient was consulted to our department.

Findings at the consultation; He was drowsy. His blood pressure of 170/82 mmHg, and a body temperature was 37.5°C. Rightward gaze palsy, downbeat nystagmus, right partial hemifacial palsy, and insufficient tongue movement and dysphagia were observed at cranial nerve examination. Right dominant quadriparesis (manual muscle test: MMT 3-4), superficial and deep sensation disturbance, was observed below the 3rd cervical spinal cord level. Bladder and rectal disturbance was present, and a urethral indwelling catheter was inserted. **Blood cell counts** showed mild hyperleukocytosis (12,790/μl). **His activated partial thromboplastin time was within normal lange.** Serum biochemical examination revealed hypernatremia (Na, 160mEq/L). Cerebrospinal fluid (CSF) was mildly bloody, showed a cell count of 160/uL (monocyte > 90%), protein was 94 mg/dL, and glucose was 91 mg/dL. **The CSF was bloody through the lumber puncture which denied trauma tap.** Serum anti-aquaporin 4 (AQP4) antibody was positive. Brain MRI on admission showed T2W high signal in the dorsal medulla along the fourth ventricle (Fig.1-a, b). No abnormalities were

observed above the tentorium. At consultation after the 11th hospital day, the medulla lesion was enlarged (Fig. 1-c, d, e), and SAH was observed on the right parietal cortex (Fig. 1-f). No vasculitis, aneurysm, or arteriovenous malformations were observed on brain MR angiography. Bilateral aspiration pneumoniae were found by thoracoabdominal CT imaging.

Clinical course; We diagnosed NMOSDs and SAH according to MRI and CSF findings. We started steroid pulse therapy (IVMP: methylprednisolone; mPSL at 1 g/day for 3 days). After IVMP, he was administered oral prednisolone (PSL; 60 mg/day) and PSL was tapered. SAH was treated conservatively. Pneumoniae was improved immediately after treatment with antibiotics. Hypertension was treated with a calcium blocker. Hypernatremia was reduced gradually by 4 mEq/L/day. Eighteen days after consultation, mechanical ventilation was discontinued because the respiratory failure was improved. CSF showed improvement. MRI showed improvement of the medullary lesion and high signal lesions of the deep white matter in the left hemisphere and corpus callosum (Fig. 1-g, h, i, j, k, l). The lesions were diminished 2 weeks later without any specific therapy (Fig. 1-m, n) and the SAH also

diminished (Fig. 1-o). PSL was continued at 10 mg/day. He was discharged from our hospital on the 52nd day after consultation. He continued his rehabilitation at another hospital, and became able to walk with a walker though dysphagia remained.

Discussion

In the present case, the brainstem lesion was diagnosed initially as an acute infarct. We considered that the IHN and brainstem lesions were the initial manifestation of NMOSDs [1]. **In this case, we did not detect hypothalamic lesions or measure serum ADH values, but hypernatremia may be associated with the hypothalamic lesions of NMOSDs because of the AQP4 immunoreactivity expressed at the hypothalamus and diencephalon** [1] **and after the IVMP, the hypernatremia improved gradually.** In the CNS, AQP4 immunoreactivity is expressed around the capillary blood vessels and foot processes of astrocytes beneath the pia matter, and sera from NMO patients disrupts the blood brain barrier [2]. **We speculate that inflammation of NMOSDs results in fragile blood vessels and it may cause the SAH.** In addition, the white matter lesions occurred temporally and diminished without specific treatment. This phenomenon is similar to

posterior reversible encephalopathy syndrome, which occurs in NMOSDs [3]. The accumulation of AQP4 may reflect the development of brain edema in human brains [4], and the presence of AQP4 in astrocytes helps regulate brain water homeostasis [5]. We speculate that functional damage to AQP4 caused the vascular hyperpermeability, which may be responsible for this etiology.

References

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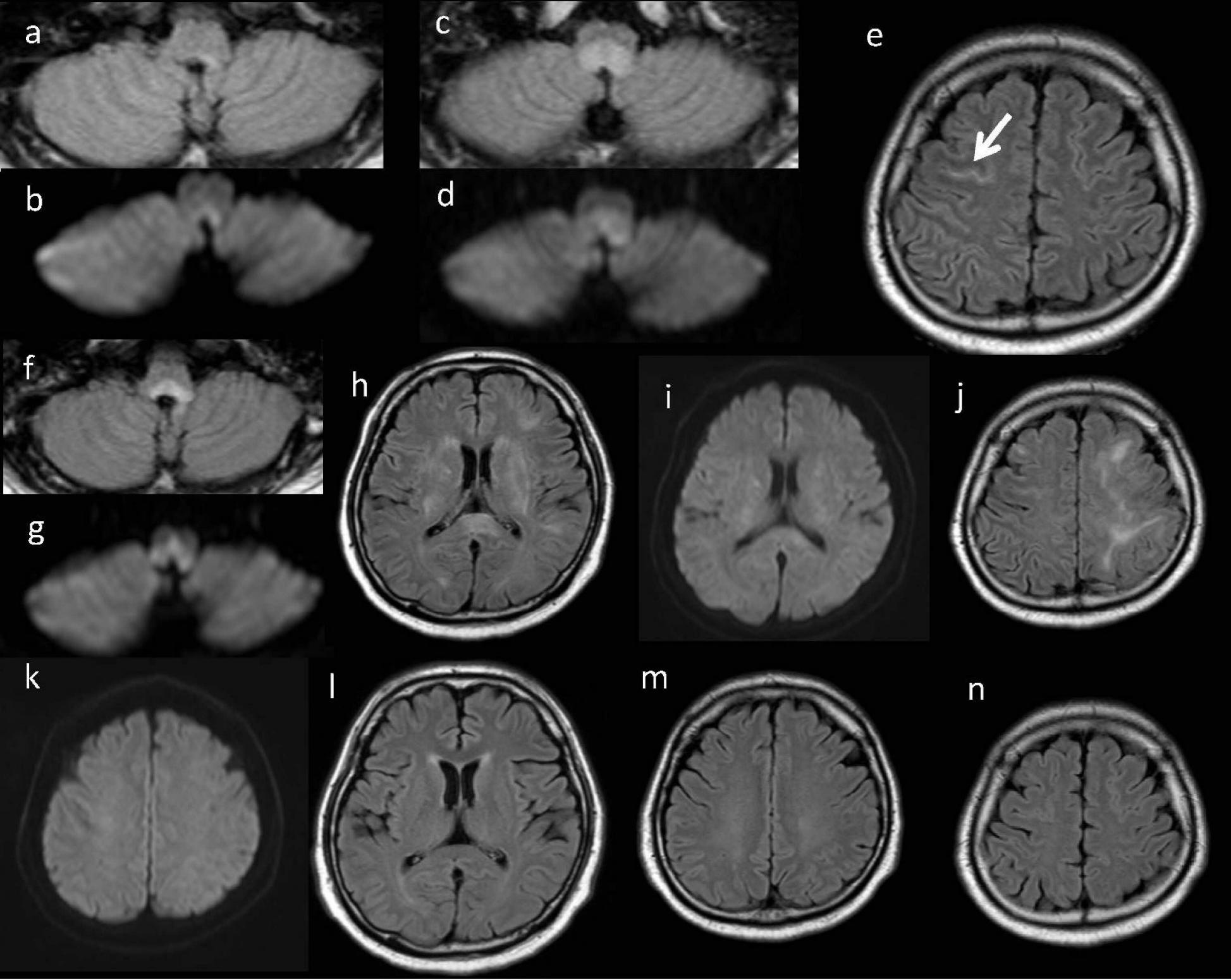
Figure legends.

Figure 1. MRI findings. {1.5T Fluid Attenuated Inversion Recovery (FLAIR); TR, 8,000 ms; TE, 100 ms, 1.5T diffusion weighted image (DWI); TR 4,000 ms; TE 70 ms, T2 weighed image TR, 2,600 ms; TE, 115 ms:}.

Medullary tegmental lesion on admission (a; FLAIR, b; DWI) and at the time of consultation (c; FLAIR, d; DWI e; sagittal T2 weighed image.). SAH on the cortex of the right parietal lobe (f; FLAIR, arrow). 18 days after the consultation, brain MRI showed improvement of the medullary lesions (g; FLAIR, h; DWI), but a high signal lesion of deep white matter of the left hemisphere and corpus callosum (i, k; FLAIR, j, l; DWI). The lesions were diminished 2 weeks later without any specific therapy (m, n; FLAIR) and SAH also diminished (o; FLAIR).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