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LETTER TO THE EDITOR

Osmotic demyelination syndrome complicating diabetes with anti-glutamic acid decarboxylase antibodies and Graves' disease: A case report

Osmotic demyelination syndrome (ODS) is a demyelinating brain disease, resulting from a rapid increase in plasma osmolality. However, ODS associated with hyperglycemia is rare, with few reports.

A 60-year-old man was presented to Nagoya Medical Center, Nagoya, Japan, after experiencing malaise, lightheadedness, impaired consciousness and disorientation during an outing in extreme heat. He had a propensity to imbalance and falling before hospitalization. On presentation, the patient had impaired consciousness, hypertension, tachycardia, fever and emaciation, with a consciousness level of 13 (E4V3M6) on the Glasgow Coma Scale, blood pressure of 181/94 mmHg, pulse rate of 155 b.p.m., body temperature of 38.0°C and a body mass index of 16.2. Blood sampling showed hyperglycemia, dehydration and ketosis with the following laboratory values: casual blood glucose 667 mg/dL; glycated hemoglobin 16.6%; blood urea nitrogen 20 mg/dL; serum creatinine 0.69 mg/dL; serum Na 132 mEq/L; serum K 5.1 mEq/L; serum Cl 97 mEq/L; serum total ketone bodies 399 μmol/L; and plasma osmolality 318 mOsm/kg. Blood gas analysis showed no acidosis, and he had no drinking history. The patient was subsequently admitted for treatment. Six hours after treatment with continuous insulin infusion and fluid replacement, the patient's blood glucose level was 317 mg/dL, plasma osmolality was 314 mOsm/kg and serum Na level was 142 mEq/L. Furthermore, concomitant Graves' disease became apparent from a thyroid-stimulating hormone level of 0.001 μIU/mL, free thyroxine level of 2.12 ng/dL, thyrotrophin receptor antibody level of 11.1 IU/L and increased thyroid blood flow by echogram, for which oral thiamazole was initiated. Type 1 diabetes was also suspected from an anti-glutamic acid decarboxylase antibody level of 2,723.3 U/mL and serum C-peptide level of 1.20 ng/mL, which was treated with intensive insulin therapy. The patient's disorientation, which included passing vague comments and abnormal behavior, increased after admission; cranial magnetic resonance imaging carried out on hospital day 7 showed a high signal intensity area on T2-weighted imaging of the central pontine region (Figure 1a). He was subsequently diagnosed with ODS-induced central pontine myelinolysis. Thereafter, he developed aspiration pneumonitis caused by dysphagia as a bulbar symptom on hospital day 12. His disorientation approached the peak on day 6, and almost disappeared on day 21. The patient's dysphagia disappeared approximately 2 months after onset. Cranial magnetic resonance imaging carried out 5 months after hospitalization showed an improved high signal intensity area (Figure 1b), and his neurological symptoms had almost completely disappeared. He has continued insulin therapy; his glycated hemoglobin increased to 7.4% and serum C-peptide level was maintained within 3.40 ng/mL 8 months after admission.

ODS often occurs because of a rapid increase in plasma osmolality, and is primarily accompanied by a rapid correc-

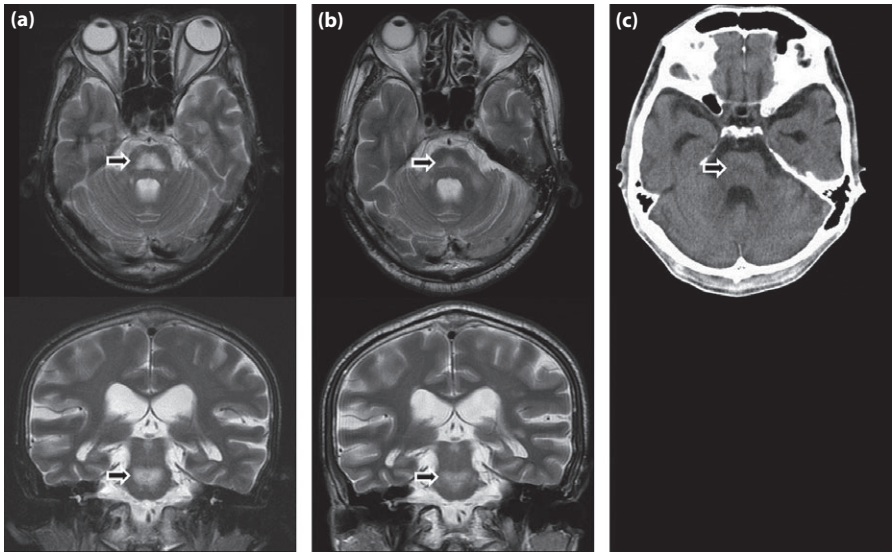

Figure 1 | Cranial magnetic resonance imaging (a) on hospital day 7, (b) 5 months after hospitalization (both T2-weighted images; upper image: transaxial view, lower image: coronal view) and (c) cranial computed tomography on admission.

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tion of hyponatremia. In contrast, it has been reported that the onset of ODS mainly results from an increase in plasma osmolality, not an increase in sodium itself[1]. In previous reports of ODS caused by hyperglycemia[2,3], ODS is diagnosed after acute treatment. Therefore, it is not clear whether ODS has already developed before admission, or if it is caused by treatment. In the present case, the serum Na level increased after a decrease in the blood glucose level after admission. However, the drop in plasma osmolality and observation of a pre-existing low-density area in the central pontine region on computed tomography (Figure 1c) on admission suggested that ODS had already occurred by the time of admission.

Immune responses, such as microglial activation, have recently been reported as a mechanism of ODS onset[4], and some previous reports of ODS were concomitant with type 1 diabetes[2,3]. However, it remains unclear if an autoimmune predisposition could have contributed to ODS pathogenesis.

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DISCLOSURE

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