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Intracranial hemorrhage caused by acute-onset severe hyponatremia

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Intracranial Hemorrhage Caused by Acute-Onset Severe Hyponatremia

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Keywords: Hyponatremia, Intracranial hemorrhage, Soy sauce ingestion

1. Case

A 52-year-old unemployed Japanese woman with depression was brought to our emergency department (ED) after an attempted suicide. She had reportedly ingested 1500 mL of soy sauce (corresponding to 277.5 g sodium chloride) 60 min before presentation. She was taking prescribed mirtazapine, 15 mg daily.

In the ED, she was agitated, and a physical examination revealed a Glasgow Coma Scale (GCS) score of 14 (E₄V₄M₆), a respiratory rate of 20 breaths/min, an oxygen saturation of 100% on room air, a blood pressure of 115/94 mmHg, a pulse rate of 110/min, and a temperature of 35.6 °C. As her initial blood [Na] was 171 mEq/L (serum [Na] was 173mEq/L), 5% dextrose solution (D5W) was intravenously administered. At 30 min post-arrival, a second blood analysis revealed an increase in her blood [Na] to 179 mEq/L and her consciousness level dropped to a GCS score of 7 (E₁V₂M₄) with a convulsive seizure. A plain computed tomography (CT) of the head revealed bilateral cerebellar hemorrhage (Fig. 1A). An intravenous bolus administration of D5W lowered her blood [Na]

from 179 to 162 mEq/L over a period of 40 min, which improved her consciousness. After this rapid correction, her blood [Na] was lowered at a rate of 0.55 mEq/L per hour. Although magnetic resonance imaging (MRI) of the head, performed on day 7, revealed hydrocephalus and cerebellar edema (Fig. 1B), she was asymptomatic. She was discharged on day 57 without neurological sequelae.

2. Discussion

Intracerebral hemorrhage induced by hyponatremia is a rare, critical condition, which stems from the brain cell shrinkage and vascular damage caused by an abrupt increase in blood sodium concentration.¹ The first series of such cases was reported in dehydrated neonates²; few were reported in adults with sodium overload.^{3–6} In a systematic review of 18 case reports of adult hyper-acute hyponatremia, all 3 cases complicated by intracerebral hemorrhage were fatal.⁷ Rapid correction of acute-onset hyponatremia in adults is not known to be harmful and recommended.¹

Abbreviations: D5W, 5% dextrose in water; ED, emergency department; GCS, Glasgow Coma Scale; CT, computed tomography; MRI, magnetic resonance imaging.

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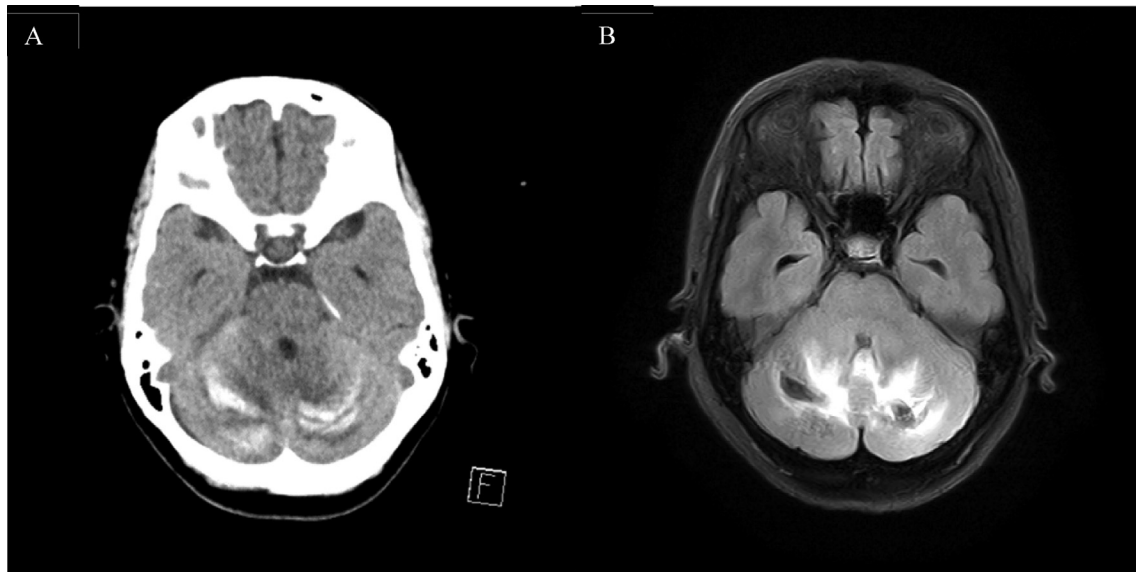


Fig. 1. Brain Imaging Findings. Noncontrast-enhanced computed tomography on admission showed bilateral cerebellar hemorrhage (A). Fluid-attenuated inversion recovery magnetic resonance imaging obtained on day 7 showed persistent cerebral edema around the hematoma in the cerebellum (B).

3. Conclusion

We reported the survival case of a 52-year-old woman with acute severe hypernatremia in whom intracerebral hemorrhage developed. Rapid sodium correction was safely achieved, and she was discharged without neurological sequelae.

Contributors

No additional contributors who do not meet the criteria for authorship.

Prior presentations

This work was presented in part at the 46th Annual Meeting of the Japanese Association for Acute Medicine, held on November 19–21, 2018, in Yokohama, Japan.

Conflict of Interest

The authors declare that there is no conflict of interest.

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References

1. Sterns RH. Disorders of plasma sodium—causes, consequences, and correction. *N Engl J Med*. 2015 Jan 1;372(1):55–65.
2. Lutterell CN, Finberg L. Hemorrhagic encephalopathy induced by hypernatremia: I. Clinical, laboratory, and pathological observations. *AMA Archiv Neurol Psychiat*. 1959 Apr; 81(4):424–432.
3. Moder KG, Hurley DL. Fatal hypernatremia from exogenous salt intake: report of a case and review of the literature. *Mayo Clin Proc*. 1990 Dec;65(12):1587–1594.
4. Mata LS, Gusmao D, Almeida AR. Hypernatremic hemorrhagic encephalopathy: case report and literature review. *Rev Bras Ter Intensiva*. 2010 Sep;22(3):305–309.
5. Roberts CJ, Noakes MJ. Fatal outcome from administration of a salt emetic. *Postgrad Med*. 1974 Aug;50(586):513–515.
6. Izutani Y, Morimoto S, Kanayama H, et al. A case of intentional massive table salt ingestion. *Nihon Kyukyu Igakukai Zasshi: J Japan Asso Acute Med*. 2016;27(8):251–255 [Japanese].
7. Goshima T, Terasawa T, Iwata M, Matsushima A, Hattori T, Sasano H. Treatment of acute hypernatremia caused by sodium overload in adults: a systematic review. *Medicine (Baltim)*. 2022 Feb 25;101(8), e28945.