Herpes Zoster Ophthalmicus and Syndrome of Inappropriate Antidiuretic Hormone Secretion

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Abstract

The syndrome of inappropriate antidiuretic hormone (SIADH) secretion is a common consequence of neurologic and pulmonary infections as well as drug intake and many other clinical situations. This report describes SIADH that developed in an elderly woman with single dermatomal herpes varicella zoster ophthalmicus without evidence of varicella zoster encephalitis or dissemination. A 76-year-old woman was admitted to our department for evaluation of left facial pain, confusion and disorientation. Further investigation revealed hyponatremia 112 mEq/L, low serum osmolality, high urine osmolality, normal renal function, normal adrenal and thyroid hormones, and high plasma vasopressin 40 pg/mL. These results indicate that the hyponatremia in this case was due to SIADH and that SIADH was caused by an increased release of vasopressin probably because of the antiviral drug (acyclovir) or infection of varicella zoster virus (VZV) in a single dermatome.

Keywords: Herpes zoster ophthalmicus, varicella zoster, inappropriate antidiuretic hormone secretion, syndrome, hyponatremia

Introduction

The syndrome of inappropriate antidiuretic hormone (SIADH) secretion is a diagnosis of exclusion characterized by hyponatremia with hypotonicity of plasma, inappropriately elevated urine osmolality, urine sodium concentration of greater than 40 mmol/L on a normal sodium intake, absence of edema or volume depletion, and normal renal, adrenal and thyroid functions (1). Severe hyponatremia associated with varicella zoster virus (VZV) was first reported in 1983, with about 30 cases documented (2), but rarely with VZV infection of a single dermatome (3, 4). Presented here is a case of SIADH that developed in a patient with herpes varicella zoster ophthalmicus limited to a single dermatome, without evidence of varicella zoster encephalitis or dissemination. This case is only the forth such case reported in the English language literature.

Case Report

A 76-year-old woman with a history of hypertension, diabetes and osteoporosis on medications with perindopril, metformin and alendronate presented for admission with a 10-day history of painful and pruritic skin eruption on her left forehead. She did not complain of excessive pain, nausea, or vomiting. The skin eruption began as vesicles on the left side of her forehead, in the distribution of the trigeminal nerve, and was preceded by burning pain in that area. It remained localized and gradually became crusted. There was minimal photophobia, eye pain, and no discharge, or attenuation of visual acuity. Standard acyclovir treatment had been started (10-12 mg/kg i.v. three times 7 days) at the referral center because the serological diagnosis was positive for antigen of VZV. Antibodies to VZV in both IgG and IgM were present in high titers in the serum.

Five days after initial findings the patient became confused and disoriented and was referred to our center.

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Table 1. Features of Cases with Limited Extent Herpes Varicella Zoster and Concomitant SIADH

<table>
<thead>
<tr>
<th>Report (year)</th>
<th>Age (years), Sex</th>
<th>Presenting symptom</th>
<th>Region involved</th>
<th>Altered mental status</th>
<th>Rash crossing dermatomes</th>
<th>Neurologic deficit</th>
<th>Serum sodium level, mEq/L</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maze et al (3), (1983)</td>
<td>72, Female</td>
<td>Dizziness, chest wall rash</td>
<td>Chest wall</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>95</td>
<td>Resolved without complications</td>
</tr>
<tr>
<td>Sato et al (4), (1990)</td>
<td>76, Female</td>
<td>Chest wall rash</td>
<td>Chest wall</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>98</td>
<td>Resolved without complications</td>
</tr>
<tr>
<td>Dhawan et al (13), (2007)</td>
<td>71, Female</td>
<td>Facial rash</td>
<td>Face</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>120</td>
<td>Resolved without complications</td>
</tr>
<tr>
<td>Present case</td>
<td>76, Female</td>
<td>Facial rash</td>
<td>Face</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>112</td>
<td>Resolved without complications</td>
</tr>
</tbody>
</table>

Physical examination revealed a temperature of 37°C (98.6°F), blood pressure of 140/80 mmHg and a pulse rate of 92 beats/minute. Physical examination of the chest and abdomen did not reveal abnormalities. There was no evidence of meningeal involvement or neurologic deficit. Laboratory results showed a white blood cell count of 11,500 cells/mm³, with 80% granulocytes, 12% lymphocytes and no bands, platelet count of 476,000 cells/mm³, serum sodium level of 112 mmol/L, serum potassium level of 3.5 mmol/L, and serum bicarbonate level of 25 mmol/L, serum blood urea nitrogen level of 10 mg/dl, and creatinine level of 0.9 mg/dl. Hyponatremia work-up showed urine sodium level of 110 mmol/L, urine osmolality of 492 mOsmol/L, and serum osmolality of 272 mOsmol/L, consistent with SIADH. Thyroid function tests and tests for adrenal function were normal. Fasting blood glucose and HbA1c were normal, and there was not any complication of diabetes. Findings on chest X-ray, magnetic resonance imaging of the head, and computed tomography of the thorax, abdomen and pelvis were within normal limits.

Under water restriction, infusion of 3% saline, treatment with loop diuretics and with complete of acyclovir therapy, mental function returned to normal within 2 days. The hyponatremia corrected with resolution of lesions and the patient was discharged on seventh day with a serum sodium level of 134 mmol/L. Follow-up clinical examination after 2 months showed no facial lesions, and laboratory examination showed a normal serum sodium level of 140 mmol/L.

Discussion

SIADH has been well described with disseminated VZV infections in immunocompromised patients such as those with stem cell transplants (5-9), cancer (2, 10) and acquired immunodeficiency syndrome (11). When pulmonary involvement occurred in VZV, hyponatremia was observed in 50% of patients (12) but the physical examination and computed tomography of the chest of the present case did not reveal any abnormalities. A common cause of hyponatremia in patients with cancer (especially lung cancer) is SIADH, which may result from ectopic production of arginine vasopressin by the tumour tissue, however in the present case the thoracoabdominal computed tomography was normal.

In contrast, the development of SIADH in patients with limited extent VZV infection is rare, making the present case unique. The condition was first described in 1983 (3), second in 1990 (4) and again only in 2007 (13). Table 1 lists the features of these reported cases and the present case as well. All other cases previously reported together with present case are female, all are of an age older than 70 years and no one has Rash Crossing Dermatomes or neurologic deficit. The previously described first two cases were found to be in an elderly age group and manifested with chest wall skin eruption. The mechanism postulated at that time was stimulation of sensory nerve osmolar receptors in the liver by herpetic involvement of right-sided chest wall T10 dermatome leading to excess antidiuretic hormone secretion by the posterior pituitary via hypothalamic stimulation (4). The third case was manifested with only facial skin eruption (13). In the present case, the patient presented with facial rash, making it the second such case.

The mechanism of SIADH is not clear but could be postulated as stimulation of the ophthalmic division of the
trigeminal nerve by herpetic involvement of the face leading to excess antidiuretic hormone secretion by posterior pituitary gland stimulation (14), or it may be related to a drug (acyclovir) with resultant SIADH (10). Prednisone may be added to acyclovir therapy in order to achieve improved quality of life measurements. Because of the SIADH involvement and comorbid diseases we could not use prednisone in the present case.

Some cases of SIADH reported in the literature are associated with diabetes mellitus. Sato et al reported a case, which was diagnosed with diabetes mellitus and hyponatremia (15). In their case, insulin treatment improved the hyperglycemia but aggravated hyponatremia, which was proved to be elicited by the SIADH. Their results suggest that the exaggerated ADH release was brought about by the baroreceptor reflex stimulated by the postural hypotension, and also by the impaired osmoregulation associated with diabetic neuropathy (15). On the other hand, asymptomatic cases of SIADH are quite frequent, hyponatremia has been observed in 6-10% of diabetic patients treated with chlorpropamide (16, 17). The present patient was not treated with insulin or chlorpropamide and she had no postural hypotension associated with autonomous neuropathy.

The SIADH may be caused by either increased hormone production or by downward resetting of the osmostat (18). The reset osmostat variation of the SIADH is thought to account for up to one-third of SIADH cases (19). Most commonly, it can cause hyponatremia in patients who are quadriplegic, psychotic, or chronically malnourished, such as those with tuberculosis or alcoholism (19). Recognition of the reset osmostat is important because it is usually asymptomatic and correcting the hyponatremia in the reset osmostat is not necessary if attempted, is difficult to sustain. Diagnosis of reset osmostat was made with the exclusion of other causes of hyponatremia. In the present case, diagnosis was not reset osmostat because the ADH level was high and the patient was symptomatic.

In the light of these findings, clinicians should be aware that SIADH may develop in elderly patients with VZV infection even when limited to just a single dermatome and hyponatremia may be resolved with the resolution of the skin eruptions with or without antiviral drug treatment.

References