Acute motor and sensory axonal neuropathy-associated syndrome of inappropriate antidiuretic hormone secretion

Weeraporn Srisung MD, Aumyot Prongdong MD, Pavis Laengvejkal MD, Sorot Phisitkul MD

Abstract

A 36-year-old man presented with a six week history of progressive ascending weakness. Physical examination showed generalized motor weakness, more severe in the lower extremities (LE), muscle wasting, absent LE reflexes, dysesthesia, and no cranial nerve involvement. Neurologic workup was consistent with acute motor and sensory axonal neuropathy (AMSAN), a variant of Guillain-Barre syndrome. Concomitantly on admission, serum chemistry panel showed a sodium (Na) 115 mmol/L with normal kidney function. Urine showed Na <20 mmol/L, and specific gravity 1.045. Urine osmolality was not available initially. He received IV fluid for volume expansion. The Na did not significantly improve after he became euvolemic. Fluid restriction was then tried with mild improvement. Endocrine work-up ruled out hypothyroidism and adrenal insufficiency. Repeat labs showed serum Na 124 mmol/L, urine Na 191 mmol/L and urine Osm 531 mOsm, and the syndrome of inappropriate antidiuretic hormone secretion (SIADH) was diagnosed. Our case report suggests that SIADH should be high on the differential diagnosis for hyponatremia in patients with AMSAN, especially in the setting of euvolemia.

Key words: hyponatremia, antidiuretic hormone, neuropathy

Introduction

The syndrome of inappropriate antidiuretic hormone secretion (SIADH) is a very common cause of hyponatremia and accounts for approximately one-third of hyponatremia cases.[1] It is associated with some medications and various medical conditions, including pulmonary diseases, CNS disorders, and malignancies, and can occur in an idiopathic form.[2] Guillain-Barre syndrome (GBS) has been associated with SIADH.[3-5] We report a case of SIADH associated with acute motor and sensory axonal neuropathy (AMSAN), a variant of GBS.

Corresponding author: Weeraporn Srisung MD
Contact Information: Weeraporn.Srisung@ttuhsc.edu
DOI: 10.12746/swrccc2015.0312.154

Case

A 36-year-old Caucasian man was admitted with a six week history of progressive ascending weakness. He initially developed left followed by right lower extremity weakness accompanied with tingling, “shock-like” sensations. He also noted lower extremity muscle wasting. He then developed left followed by right upper extremity weakness a few days prior to

admission. No back pain, bladder/bowel dysfunction, perineal numbness or breathing/swallowing difficulty was reported. No recent infection was apparent. His physical examination showed blood pressure 124/80 mmHg, heart rate 105 beats per minute, respiratory rate 16 per minute, and temperature 98.3° F. He appeared alert and oriented. Heart, lung and abdominal examinations were unremarkable. No jugular venous distension or lower extremity edema was noted. Neurological examination showed generalized motor weakness, more severe in the lower extremities compared to the upper extremities, muscle wasting, absent knee and ankle reflexes, dysesthesia and decreased sensation in the lower extremities, and no cranial nerve involvement. Magnetic resonance imaging of the head and whole spine showed no significant abnormality. Cerebrospinal fluid analysis (CSF) showed albuminocytologic dissociation. Cerebral spinal fluid cultures and serologies ruled out any infectious etiology for his symptoms. Testing for HIV, viral hepatitis, and paraproteinemia was negative. Anti-GM1 and GQ1b were negative. A nerve conduction study showed an axonopathic pattern on motor and sensory fibers bilaterally. Thus, AMSAN was diagnosed. He received intravenous (IV) immunoglobulin with gradual improvement of his weakness.

On admission, his serum chemistry panel showed sodium (Na) 115 mmol/L, potassium 3.1 mmol/L, chloride 75 mmol/L, bicarbonate 25 mmol/L, BUN 9 mg/dL, and creatinine 0.4 mg/dL. Measured serum osmolality (Osm) was 234 mOsm. Urine Na was <20 mmol/L; urine specific gravity was 1.045. Urine osmolality was not available initially. The patient was given IV normal saline infusion for volume expansion. The Na did not significantly improve after he became euvolemic. Fluid restriction was then tried with mild improvement. Endocrine work-up ruled out hypothyroidism and adrenal insufficiency. Repeat laboratory studies showed serum Na 124 mmol/L, urine Na 191 mmol/L, and urine Osm 531 mOsm, and SIADH was diagnosed. Tolvaptan was started at 15 mg and resulted in significantly increased urine output (300-500 ml/hr). Na increased from 112 to118 mmol/L within 3 hours. Dextrose 5% in water was started in order to prevent osmotic demyelination syndrome from a rapid rise in serum Na level. Tolvaptan was restarted at 7.5 mg two days later with good response. The patient was continued on 7.5 mg daily before he was discharged on day 28 with Na level of 130 mmol/L. He did have significant residual weakness despite two courses of IV immunoglobulin.

Discussion

The syndrome of inappropriate antidiuretic hormone secretion (SIADH) is a common hyponatremic disorder characterized by impaired urinary dilution in the setting of normal kidney function with resultant hypotonic hyponatremia.[6] Careful clinical assessment is needed to make the diagnosis. Although volume assessment by clinical examination often provides information, laboratory testing is almost always needed to make this diagnosis, especially in patients with subtle degrees of hypo-or hypervolemia.[7] The causes of SIADH can be divided into 3 categories: endogenous, exogenous, and idiopathic.[6] The endogenous causes of SIADH include increased hypothalamic production of antidiuretic hormone (ADH), ectopic ADH secretion, potentiation of ADH effect, and the nephrogenic syndrome of inappropriate antidiuresis. An exogenous cause of SIADH is administration of ADH or its analogues.

Guillain-Barre' syndrome (GBS) is a neurological disease in which the immune system damages the peripheral nervous system, often triggered by antecedent events including infections. Although the classic demyelinating type of GBS is common, its axonal variant involving both motor and sensory fiber or AMSAN, is much rarer.[8] Classic GBS appears to be an endogenous cause of SIADH and has been frequently reported in the medical literature.[3] However, to our knowledge, AMSAN-associated SIADH has been only rarely reported.[4,5]

Our patient presented with asymptomatic hyponatremia. Although initially the patient's clinical presentation, including tachycardia along with low urine sodium and high urine specific gravity, suggested vol-

ume depletion, after volume expansion by IV normal saline administration, his sodium level still remained low. After euvolemia was achieved, repeat laboratory studies showed serum Na 124 mmol/L, urine Na 191 mmol/L and urine Osm 531 mOsm consistent with SIADH. We suspect that the patient had a combination of SIADH and volume depletion initially. SIADH was later unmasked after volume expansion. Other well-established causes of SIADH were ruled out, and as a result, AMSAN was considered the most likely cause of SIADH. The pathogenesis of GBS-associated SIADH is not completely understood; the medical literature suggests that it is a vasopressin-independent mechanism. Markedly increased renal tubular sensitivity to vasopressin is also another possibility.[9] Therefore, we suspect that AMSAN-associated SIADH might share the same mechanism(s). The treatment of SIADH includes various strategies, depending on acuity, degree of symptoms, and treatment response. Our patient did not respond to fluid restriction, and a vasopressin receptor antagonist was used. Physicians need to remember that osmotic demyelination syndrome may occur with rapid increase in serum Na level. Therefore, frequent Na monitoring is required, and the use of D5W may be needed to prevent rapid rising of Na level. Our patient received D5W for this purpose, and he did not develop osmotic demyelination syndrome.

We conclude that both classic GBS and AMSAN can cause hyponatremia. The syndrome of inappropriate antidiuretic hormone secretion should be high on the differential diagnosis for hyponatremia in patients with AMSAN, especially in the setting of euvolemia.

Author Affiliation: Weeraporn Srisung is a resident in Internal Medicine at Texas Tech University Health Science Center in Lubbock, TX. Aumyot Prongdong is a fellow in Nephrology at TTUHSC in Lubbock TX. Pavis Laengvejkal is a resident in Neurology at TTUHSC in Lubbock, TX. Sorot Phisitkul is a faculty member in Nephrology at TTUHSC in Lubbock, TX.
Received: 06/29/2015
Accepted: 09/25/2015
Reviewers: Vaqar Ahmed MD
Published electronically: 10/15/2015
Conflict of Interest Disclosures: none

References

1. Anderson RJ, Chung HM, Kluge R, Schrier RW. Hyponatremia: a prospective analysis of its epidemiology and the pathogenetic role of vasopressin. *Annals Int Med* 1985;102(2):164-8.
2. Gross P. Clinical management of SIADH. *Therap Adv Endo Metab* 2012;3:61-73.
3. Monzon Vazquez T, Florit E, Marques Vidas M, Rodriguez Cubillo B, Delgado Conde P, Barrientos Guzman A. Syndrome of inappropriate antidiuretic hormone hypersecretion associated with Guillain-Barre syndrome. *Nefrologia* 2011;31(4):498-9.
4. Cakirgoz MY, Duran E, Topuz C, Kara D, Turgut N, Turkmen UA, et al. Syndrome of inappropriate antidiuretic hormone secretion related to Guillain-Barre syndrome after laparoscopic cholecystectomy. *Brazilian J Anesesth* 2014;64:195-8.
5. Saifudheen K, Jose J, Gafoor VA, Musthafa M. Guillain-Barre syndrome and SIADH. *Neurol* 2011;76:701-4.
6. Esposito P, Piotti G, Bianzina S, Malul Y, Dal Canton A. The syndrome of inappropriate antidiuresis: pathophysiology, clinical management and new therapeutic options. *Nephron Clin Pract* 2011;119:c62-73.
7. Decaux G, Musch W. Clinical laboratory evaluation of the syndrome of inappropriate secretion of antidiuretic hormone. *Clin J Amer Soc Neph : CJASN* 2008;3:1175-84.
8. Winer JB. An update in guillain-barre syndrome. *Autoimmune Dis* 2014; 2014:793024.
9. Cooke CR, Latif KA, Huch KM, Wall BM. Inappropriate antidiuresis and hyponatremia with suppressible vasopressin in Guillain-Barre syndrome. *Amer J Neph* 1998;18:71-6.