Hypertrophic Pachymeningitis and the Syndrome of Inappropriate Antidiuretic Hormone Secretion: Coincidence or Cause?

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Significance of the Study

- This case of syndrome of inappropriate antidiuretic hormone secretion (SIADH), probably due to hypertrophic pachymeningitis (HP), was managed conservatively with moderate fluid restriction that almost restored normal serum osmolality and sodium levels. Clinicians should be aware of SIADH caused by HP and the use of conservative treatment for such a case.

Keywords

Hypertrophic pachymeningitis · Syndrome of inappropriate antidiuretic hormone secretion · Hyponatremia

Abstract

Objective: To investigate a potential cause of the syndrome of inappropriate antidiuretic hormone secretion (SIADH). **Clinical Presentation and Intervention:** A 70-year-old female patient had nausea and collapsed. Although euvoletic, pathological laboratory findings showed hyponatremia and hypoosmolality, and cerebral magnetic resonance imaging showed hypertrophic pachymeningitis. Secondary hypertrophic pachymeningitis was excluded. Other nonneurological reasons for SIADH were also excluded. Moderate fluid restriction restored an almost normal serum osmolality and sodium. **Conclusion:** This case of SIADH was conservatively treated with moderate fluid restriction that almost restored normal serum osmolality and sodium levels.

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Introduction

The syndrome of inappropriate antidiuretic hormone secretion (SIADH) leads to euvoletic hyponatremia [1]. Hyponatremia and hypoosmolality result from inappropriate action of antidiuretic hormone. This inappropriate action can be caused by a hypersecretion of the antidiuretic hormone from the hypothalamus or by ectopic production [1]. The etiology of SIADH is various and can be grouped into 4 major categories: pulmonary disease, neoplasia, drug action, and nervous system disorder, e.g., in many reports acute forms of meningitis and tuberculous meningitis with SIADH have been described [1]. Hypertrophic pachymeningitis (HP) causes a thickening of the dura mater, including cranial or spinal dura, and sometimes both. It is regarded as a rare medical condition [2]. In the most recent report, Yonekawa et al. [3] estimated a crude HP prevalence of 0.949/100,000 persons, with about half of the cases being idiopathic HP. Symptoms are variable [2]: symptoms of the cranial form can

Color version available online

Fig. 1. T1 contrast axial MRI image: diffuse enhancement with thickening of the meninges (see arrow).

be headache, cranial nerve palsies, or cerebellar dysfunction. Seizures may also be a symptom, too. Radicular pain, muscular weakness, or atrophy, as well as spastic paresis and loss of sphincter function can be symptoms when the spinal dura is involved.

The diagnosis of primary or idiopathic HP is established when no identifiable cause is found [4]. Secondary forms have coexisting causes such as syphilis, tuberculosis, rheumatoid arthritis, sarcoidosis, pauci-immune vasculitis, or infections with *Candida* or *Aspergillus flavus* [4]. Hence, the objective of this report was to investigate a possible causality in a female patient with primary HP and SIADH.

Case Report

A 70-year-old female patient had vertigo and nausea, and then collapsed. At admission to the emergency room of Thuringa Clinic Saalfeld, she had fully regained consciousness. She did not have any tongue lacerations. Regarding her medical history, she reported hypertension that had since 5 years been treated with 5 mg of ramipril daily and no other medication. She had received thyrostatic treatment in the 1990s due to Graves' disease. Physical examination showed normal body mass index and vitiligo on her hands and feet. She was normotensive and had a rhythmic heart action. She was normally hydrated and had no signs of exsiccosis. Furthermore, there were no pathological findings in her lungs or abdomen. She did not present with dyspnea and had not previ-

ously. The neurological examination was normal. The left wrist was swollen and movement was painful after her fall.

At admission, laboratory findings were low level of sodium: 129 mmol/L (reference range: 136–145), serum osmolality: 261 mOsm/kg (reference range: 285–295), urine osmolality: 512 mosmol/kg (reference range: 50–1,200), sodium in urine: 48 mmol/L, serum creatinine: 57 μ mol/L (reference range: 44–80 μ mol/L), potassium: 3.9 mmol/L (reference range: 3.5–5.1 mmol/L), urea: 2.03 mmol/L (reference range <11.9 mmol/L), serum cortisol: 13.2 pg/dL (reference range: 4.82–19.5 pg/dL), and thyroid-stimulating hormone: 2.4 mU/L (reference range: 0.27–4.2 mU/L).

A chest X-ray showed no pathological findings, and X-ray of the left hand showed a compression fracture at the base of ground phalanx II. A magnetic resonance imaging scan of the brain did not reveal any intracerebral pathology. However, pachymeningitis hypertrophica was detected (Fig. 1).

The patient was fully conscious. The serum sodium levels were slowly normalized. Further diagnostic assessment of SIADH (lung disease, neoplasia, neural disorder?) and a differential diagnosis between a primary and a secondary form of HP was performed.

Sonography of the abdomen and high-resolution computed tomography of the lung were without pathological findings. The serum was negative for angiotensin-converting enzyme, soluble IL-2 receptor, rheumatoid factor, antinuclear antibodies, and c- and p-anti-neutrophil cytoplasmic antibody. Antibodies against the human immunodeficiency virus, *Candida*, *Aspergillus*, and *Cryptococcus neoformans*, as well as hepatitis B surface antigen were negative. The quantiferon test was negative. Cerebrospinal fluid analysis revealed a normal cell count and protein and sugar levels. The cerebrospinal serology for *Treponema pallidum*, *Aspergillus*, and *Cryptococcus* were also negative. After this diagnostic workup, further diagnostic steps (e.g., dura biopsy) were not regarded necessary by our consultant neurologist.

At discharge, the patient was instructed to reduce her fluid intake that varied between 2 and 2.5 L before admission by about 300 mL/day. One month later in our Medical Outpatient Department, her condition was excellent and the level of sodium was 133 mmol/L (reference range: 136–145) and the serum osmolality was 276 mOsm/kg (reference range: 285–295). Because she was in good condition, her sodium and serum osmolality levels were acceptable.

The patient gave her written informed consent to publish this report.

Discussion

SIADH was diagnosed in an elderly female. SIADH was confirmed by laboratory findings and the effectivity of fluid restriction further supported the diagnosis. The only salient pathology that our diagnostic assessment revealed was HP.

After thoroughly ruling out causes for a secondary form of HP (early reports were frequently in a relationship to syphilis or tuberculosis) [4, 5], a diagnosis of primary (idiopathic) pachymeningitis was established. Primary HP is discussed as an autoimmune disease [2]. In

this context the patient's history with vitiligo and Graves' disease is noteworthy. Furthermore, we ruled out causes for SIADH such as medication influencing the sodium levels, and we ruled out overt neoplasia and found no hint of pulmonary disease. This leaves cerebral disorder, and in this very case HP as a possible explanation for SIADH. However, it has to be taken into consideration that elderly patients with hyponatremia are more prone to "idiopathic" SIADH. In a very recent study by Ganguli et al. [6], idiopathic SIADH was reported in 9.4–16% of hyponatremic geriatric patients. The number corresponds well with the 15.2% reported by Miller et al. [7] in an older study from 1996. Other authors have reported even 50% of idiopathic SIADH in elderly patients with hyponatremia [8]. Idiopathic SIADH is a diagnosis by exclusion. However, we want to point out that our patient (apart from hypertension) was not that comorbid and frail as many of the patients in these reports. The mechanisms for why cerebral conditions and disorders can cause SIADH

are not fully understood, which also accounts for this case. The report of a single case cannot establish causality, but we see reasons supporting causality between the entities. However, the fact that this has not been described yet may be related to the sheer rareness of HP [1] and maybe the lack of a concomitant endocrinological diagnostic.

Conclusion

This case of SIADH was conservatively treated with moderate fluid restriction that almost restored normal serum osmolality and sodium levels. HP could be the reason of SIADH in this case.

Disclosure Statement

The authors report no conflicts of interest.

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