

A Unique Case of Chronic Hyponatremia Secondary to Alcohol Potomania Resulting in Complex Neurodegenerative Condition

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Abstract— *The consumption of alcohol plays a significant role in various diseases, injuries, and health conditions. The burden of alcohol-related diseases and injuries can be assessed based on scientific evidence that highlights alcohol's involvement in their cause, occurrence, and consequences. One condition, known as alcohol potomania, is characterized by hyponatremia resulting from excessive alcohol consumption—especially beer—combined with poor dietary intake. This syndrome requires increased awareness among the population and demands immediate medical attention. Chronic hyponatremia, a common electrolyte imbalance seen in elderly patients, is linked to brain function and significantly affects a patient's ability to live a healthy, independent life. We present a case involving an elderly patient who initially collapsed and was found to have hyponatremia, despite having no significant past medical history. The patient had a habit of excessive beer consumption and poor dietary habits due to their occupation. Over the years, the patient experienced recurrent hospital admissions due to falls caused by an unsteady gait and balance issues. In a short span, the patient demonstrated a rapid decline in mobility, transitioning from using a walking stick to requiring a wheelchair. Neurologically, the patient exhibited progressive deterioration, including chronic hyponatremia, increased rigidity in both upper limbs, visual changes, dysphonia, square wave jerks, restricted eye movements, and cognitive impairments. Initially, the diagnosis of Parkinson's disease was made, and the patient was treated with levodopa; however, their neurological condition continued to worsen. Eventually, the patient was diagnosed with Progressive Supranuclear Palsy (PSP) and was managed with a high dose of dopaminergic medication to control symptoms. The evaluation and management of this complex case involve a multidisciplinary team that includes both community and tertiary care. Awareness campaigns, education, and early recognition of alcohol potomania would greatly benefit both the population and healthcare systems.*

Keywords— *Alcohol potomania, Chronic hyponatremia, Parkinson disease, Progressive supranuclear palsy.*

I. INTRODUCTION

Alcohol is the most abused substance and has detrimental effects on both the physical and mental health of individuals. The pattern and level of alcohol consumption significantly contribute to various chronic diseases.⁽¹⁾ For instance, beer potomania, reported in the 1970s, illustrates the link between alcohol consumption and hyponatremia, which occurs due to fluid imbalance in the body.⁽²⁾ There is evidence suggesting that chronic hyponatremia can adversely affect gait, cognitive function, and neurological performance, leading to an increased risk of falls. Although the brain can adapt to long-term hyponatremia, studies involving rats indicate that the glutamate content in brain cells decreases within a few days. This reduction affects synaptic excitatory neurotransmission, although the specific impacts on the neurotransmission process remain unclear.⁽³⁾

Progressive supranuclear palsy is a rare neurological condition that leads to mobility problems and significantly impacts a patient's quality of life.⁽⁴⁾ Patients with progressive supranuclear palsy require more healthcare support compared to the general population, which creates economic pressure on the healthcare system, as their management often involves a multidisciplinary team.⁽⁵⁾

In this report, we aim to discuss the effects of hyponatremia caused by excessive alcohol consumption and poor nutritional intake in patients over the long term. This condition adversely affects neurological function, resulting in a decreased quality of life for patients and placing an economic burden on the healthcare system.

II. CASE REPORT

We are discussing a patient in their early 60s who experienced a collapse at work without any warning signs in 2018. At that time, the patient had no significant past medical or family history. Upon examination, the patient's vital signs were normal, and the physical examination indicated hypervolemic or euvolemic hydration status. Biochemical investigations revealed a serum sodium level of 108 mEq/L, normal cortisol levels, urine sodium less than 20 mEq/L, and urine osmolality below 256 mOsm/Kg. A CT scan of the brain showed a right frontal hematoma and early global cerebral cortical atrophy. Additionally, as an incidental finding, the patient had an elevated troponin level of 4798 ng/L, although they denied any cardiac symptoms. The patient was diagnosed with ST-segment elevation myocardial infarction (STEMI) in the anterior wall and was managed conservatively, as recommended by the cardiology team. There was also a suspicion of community-acquired pneumonia due to a mild increase in infectious markers, which was treated with antibiotics. Initially, the severe hyponatremia was treated as an acute condition with fluid restrictions, followed by sodium replacement using isotonic solutions. A mixed approach of fluid restrictions and isotonic fluid therapy was used, ensuring a slow correction of the hyponatremia. The patient was prepared for discharge once the serum sodium stabilized above 125 mEq/L, with a plan for further investigation of the hyponatremia in the community.

The patient was readmitted due to a fall in early 2019 and experienced a decline in mobility, transitioning from independent walking to using a stick for support. Over the next few years, the patient continued to have recurrent falls and developed neurological symptoms. Throughout these admissions and GP investigations, the patient's serum sodium levels remained low, and other biochemical reports showed no significant abnormalities. In 2023, the patient had an increased number of falls leading to another hospital admission. Biochemical investigations revealed a serum sodium level of <135 mEq/L, urine sodium at 68 mEq/L, urine osmolality >500 mOsm/Kg, and plasma osmolality <275 mOsm/Kg. These findings supported the diagnosis of Syndrome of Inappropriate Antidiuretic Hormone (SIADH). Over the next few months, the patient exhibited notable neurological symptoms, including ataxia, dysphonia, and dysgraphia. They experienced bradykinesia in both upper limbs, a reduced range of facial expressions and eye movements, and brisk deep tendon reflexes in both lower limbs upon examination. The patient also showed slow speech and cognitive impairment. Mobility significantly deteriorated, impacting their quality of life.

The patient was reviewed by the Parkinson's disease team at the request of their general practitioner. They were started on dopaminergic medications for atypical Parkinson's disease. However, after beginning these medications, the patient's

neurological symptoms worsened. In response to this decline, the general practitioner expedited a review by the neurology team to assess the patient's lack of response to the dopaminergic drugs. The patient experienced a rapid decline in neurological function and mobility, which significantly affected their quality of life. Upon evaluation, the neurology team diagnosed the patient with progressive supranuclear palsy and recommended a symptomatic management plan involving a multidisciplinary team. The patient's mobility significantly deteriorated from walking with a cane to being unable to transfer from a chair to a bed without assistance. Consequently, the patient was discharged to a nursing home, where they would receive support along with community physiotherapy and occupational therapy to help improve their quality of life.

III. DISCUSSION

This patient presented to the hospital with severe, symptomatic hyponatremia. Following this initial admission, the patient experienced a decline into complex neurological conditions due to chronic hyponatremia, which adversely affected brain function. During our discussions with the patient's family, we learned that the patient had developed a habit of consuming more alcohol than the recommended amount, specifically beer, while often neglecting proper nutrition. This habit stemmed from the pressures of managing their own fish and chips restaurant, where alcohol became an escape from the burdens of responsibility. Before the patient's first hospital admission, they frequently came home from work with wounds on their body. Initially, these injuries were attributed to alcohol consumption, even though the patient had stopped drinking months prior to these episodes. This leads us to suspect that the patient may have experienced frequent falls and gait imbalance before the first admission.

This clinical presentation suggests that symptomatic hyponatremia may be causing gait imbalance and recurrent falls in the patient. Given that the patient had no other causes for severe hyponatremia and a history of excessive alcohol intake with poor nutritional status, alcohol potomania was considered. Additionally, other causes of chronic hyponatremia that can affect brain function include thyroid dysfunction, hyperglycemia-induced hyponatremia, pseudohyponatremia, and rapid correction of acute hyponatremia. Patients with a history of excessive beer consumption and poor nutritional intake often initially present with symptomatic hyponatremia. While investigations typically target the most common causes of

hyponatremia, the possibility of alcohol potomania may be overlooked. Consequently, the patient may experience neurological deterioration in a short period due to chronic hyponatremia, ultimately leading to a reduced quality of life. Hyponatremia is a common electrolyte imbalance among elderly patients in hospitals. Therefore, comprehensive investigations and increased awareness among medical professionals can significantly improve patient outcomes through effective multidisciplinary management plans.

Raising awareness among the medical team would have led to a more thorough evaluation and history taking during the first encounter with symptomatic hyponatremia in a patient who had consumed excessive alcohol. It is important to consider the possibility of chronic hyponatremia, which can result in the Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH), as well as its impact on neurological functions. Chronic hyponatremia can lead to a rapid decline in both cognitive and motor functions in patients. The early involvement of a multidisciplinary team in the management of symptomatic hyponatremia, both in hospital settings and community care, is crucial. Additionally, medical professionals in both tertiary and primary care need to be aware of Alcohol (beer) potomania, as it is easy to overlook. Educating the community about Alcohol (beer) potomania and its consequences—specifically its impact on quality of life—would benefit patients by promoting responsible drinking and better nutrition. Increased awareness of hyponatremia resulting from excessive alcohol consumption, along with its long-term physical and mental health complications, would foster a better understanding within the community. This understanding could lead to improved health outcomes and enhance both health economics and quality of life.



A. CT Brain



Fig. 1. Patient’s CT brain on first admission showing early global cerebral cortical atrophy

B. MRI Brain

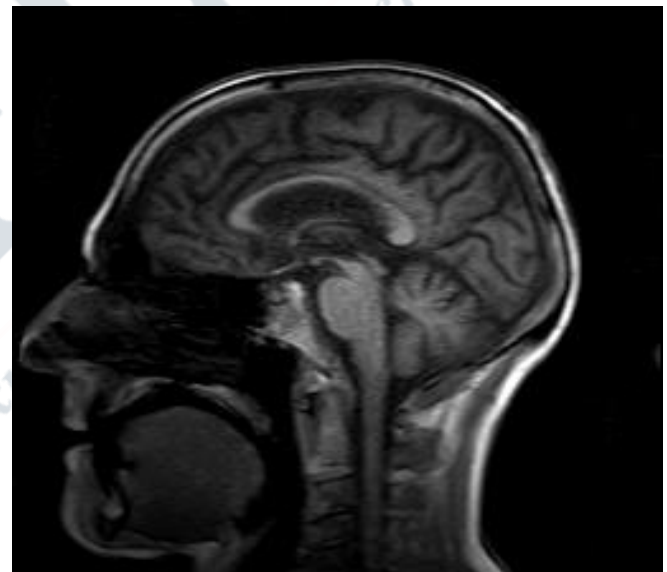


Fig. 2. MRI Brain – nil significant radiological findings for PSP

IV. CONCLUSIONS

1. Detailed evaluation of symptomatic hyponatremia in elderly patients on first presentation.
2. Consideration of excess alcohol consumption as one of the causes of acute electrolyte imbalance.
3. Neurodegenerative symptoms due to chronic hyponatremia.
4. Rapid decline in motor functions and cognition over months secondary to chronic hyponatremia.

5. Early involvement of multidisciplinary team input in management of symptomatic hyponatremia both in hospital and community care.
6. Recurrent falls care and assessment in hyponatremia patients.
7. Awareness about alcohol potomania among medical professionals gains its importance as its easily overlooked and in community might benefit people to consider responsible alcohol consumption.

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