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Clinical Vigilance during Epilepsy Management as Proactively Monitoring Adverse Effects of Sodium Valproate: A Case Report

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Abstract

Sodium valproate, a first-line antiepileptic drug, is extensively utilized in the treatment of both primary and secondary generalized seizures. Approved by the U.S. Food and Drug Administration (FDA) since 1978, this compound is integral to seizure management. However, clinicians must remain vigilant regarding its potential adverse effects, which can include tremors, Reye-like syndrome, sedation, hepatic toxicity, reduced platelet counts, and pancreatitis. Understanding the pharmacodynamics and safety profile of sodium valproate is crucial for optimizing therapeutic outcomes while minimizing risks in patients requiring long-term antiepileptic therapy. Continuous monitoring is advised to manage and mitigate these side effects effectively. A 19-year-old male student admitted to the emergency department of a teaching hospital with gradually worsening drowsiness, accompanied by nausea and short-lived vomiting. He displayed signs of confusion and altered mental status, including disorganized speech, and complained of severe muscle cramps in his legs. After taking a detailed history from the patient's representative, it was confirmed that the patient experienced an epileptic seizure six months ago. The patient is currently receiving treatment from a psychiatrist and is prescribed Sodium Valproate at a dosage of 500 mg once daily. The patient's blood was sent for pathological tests, and symptomatic treatment was initiated, which included the administration of normal saline, as well as antiemetics and analgesics. Upon review of the blood report, it was revealed that the sodium level was markedly decreased (86 mEq/L). Considering the clinical literature and the patient's medical history, a provisional diagnosis of drug-induced hyponatremia was established. Clinicians should emphasize the importance of closely monitoring patients taking sodium valproate for hyponatremia and associated complications. *[Journal of National Institute of Neurosciences Bangladesh, January 2025;11(1):88-91]*

Keywords: Hyponatremia, Antiepileptic, Adverse Effects, Confusion, Drowsiness

Introduction

Sodium valproate, an established first-line antiepileptic agent, is efficacious in the management of diverse seizure disorders but is associated with a significant risk of adverse effects, notably hyponatremia[1,2]. This electrolyte disturbance, characterized by a serum sodium concentration below 135 mEq/L, may arise through multiple pathophysiological mechanisms during sodium valproate therapy[3]. One proposed mechanism involves the modulation of renal sodium and water homeostasis; sodium valproate may influence the secretion of antidiuretic hormone (ADH), resulting in the inappropriate retention of water and subsequent dilutional hyponatremia[4,5]. Furthermore, sodium valproate is implicated in the induction of metabolic derangements, such as hepatic impairment and pancreatitis, which can exacerbate sodium dysregulation and electrolyte imbalances[6]. The incidence of hyponatremia among patients receiving sodium valproate therapy warrants clinical vigilance, as it may present with a spectrum of clinical manifestations ranging from mild nonspecific symptoms-such as lethargy and gastrointestinal disturbances-to severe neurological complications, including altered mental status and seizures. Continuous monitoring of serum electrolyte levels, particularly sodium, is imperative, especially in patients with comorbidities that predispose them to electrolyte imbalances[7]. Given the critical nature of these disturbances, a comprehensive understanding of the pharmacodynamics of sodium valproate and its impact

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on the body's homeostatic mechanisms is essential. Timely recognition and intervention for hyponatremia are vital to avert serious sequelae, underscoring the necessity for healthcare providers to educate patients on the clinical features indicative of this condition.

Case Presentation

A 19-year-old male student was admitted to the emergency department of a teaching hospital with progressively worsening drowsiness, accompanied by nausea and episodes of short-lived vomiting. He exhibited signs of confusion and altered mental status, characterized by disorganized speech, and reported experiencing severe muscle cramps in his legs. A detailed history taken from the patient's representative revealed that approximately six months prior, he had experienced a sudden epileptic seizure, leading to an evaluation by a psychiatrist. At that time, he underwent an electroencephalogram (EEG) and blood tests, resulting in a prescription for sodium valproate 500 mg once daily for seizure management. The psychiatrist advised regular follow-up appointments to monitor his condition and the effectiveness of the medication. Notably, the current symptoms began about 12 hours ago, raising concerns about a potential exacerbation of his underlying condition and the need for urgent medical evaluation and intervention. After taking the patient's history, he was sent immediately to the lab for vital signs monitoring, an EEG, and blood tests. The patient presented with notable pallor, which raised concerns about possible anemia or reduced hemoglobin levels, necessitating further investigation to uncover potential underlying causes.

Vital signs revealed a pulse rate of 69 beats per minute, with no immediate cardiovascular distress. However, the respiratory rate of 18 breaths per minute indicated mild tachypnea, which may be associated with anxiety, pain, or early respiratory distress. Blood pressure readings of 100/60 mmHg were on the lower side. The patient's oxygen saturation at 98% on room air was reassuring, indicating adequate oxygenation without immediate respiratory failure. He was afebrile. Symptoms of lethargy and drowsiness indicated altered mental status, potentially linked to central nervous system involvement. Examination of the pupils revealed that both were equal and reactive to light, suggesting intact brainstem function. After reviewing the blood report, it was found that hematological values are normal, but electrolyte levels show that the sodium level is markedly decreased (86 mEq/L). Based on the current literature and the patient's history, a provisional diagnosis of hyponatremia has been made. After that, the patient had their sodium valproate treatment discontinued and was started on 3% NaCl IV, along with an injection of Pantoprazole and nutritional supplements. Hyponatremia resolved 12 days after discontinuation of sodium valproate.

Discussion

Sodium valproate, a cornerstone in the management of epilepsy, presents significant challenges due to its associated risk of hyponatremia, particularly in young adults[8,9,10]. This case illustrates a 19-year-old male with acute onset drowsiness, confusion, and muscle cramps, ultimately leading to the identification of severe hyponatremia (86 mEq/L). Such electrolyte disturbances can stem from sodium valproate's impact on renal function and antidiuretic hormone (ADH) regulation, highlighting the drug's potential to disrupt homeostatic mechanisms critical for electrolyte balance[11,12].

A review of the literature reveals that the incidence of hyponatremia in patients on sodium valproate ranges from 1.0% to 15.0%, with severe cases leading to neurological sequelae, as evidenced by altered mental status and seizures[13,14]. The pathophysiological underpinnings suggest that valproate may enhance ADH secretion or impair renal water excretion, culminating in dilutional hyponatremia. Clinicians must be aware of these risks, especially in populations predisposed to electrolyte imbalances[15,16].

Management strategies for drug-induced hyponatremia emphasize prompt discontinuation of sodium valproate and the initiation of hypertonic saline therapy. In this instance, the patient's sodium levels normalized within 12 days following the cessation of the drug and appropriate fluid management. The integration of supportive therapies, including nutritional supplementation and proton pump inhibitors, further underscores the comprehensive approach needed to manage such complications[17-20].

Hyponatremia management involves a systematic approach beginning with assessment. First, confirm hyponatremia by measuring serum sodium levels, ensuring they are below 135 mEq/L. Next, classify the severity of the condition and evaluate the presence of symptoms. Identifying underlying causes is crucial, which includes reviewing the patient's medication history, particularly the dosage of sodium valproate and any concomitant medications. Additionally, investigate other potential etiologies contributing to the hyponatremia[20,21].

Monitoring is essential, requiring serial serum sodium measurements every 2 to 4 hours for severe cases, along with neurological assessments to check for signs of

cerebral edema. For fluid management, asymptomatic patients may benefit from fluid restriction, while symptomatic patients should receive hypertonic saline (3% NaCl) to address severe symptoms. Administer this treatment slowly, at a rate of 1-2 mL/kg over 1-2 hours, and closely monitor serum sodium levels to avoid correcting more than 6-8 mEq/L within 24 hours[22,23].

Once immediate needs are addressed, consider adjusting or discontinuing sodium valproate as needed, and evaluate alternative therapies for the underlying condition. Following up involves continuous monitoring of serum sodium and clinical status, adjusting treatment based on the patient's response. Patient education is also critical, informing them about signs and symptoms of hyponatremia and the importance of medication adherence and follow-up appointments.

Important considerations include the safety of avoiding rapid correction to prevent osmotic demyelination syndrome and individualizing treatment based on specific patient needs. In complex cases, referral to nephrology or endocrinology may be necessary[23,24].

This case underscores the necessity of vigilant monitoring of electrolyte levels in patients on sodium valproate, particularly those with existing vulnerabilities. It also reinforces the imperative for healthcare providers to educate patients about the signs and symptoms of hyponatremia, facilitating early recognition and intervention to prevent potentially severe outcomes.

Conclusion

In summary, this case summary mention in table 1 highlights the imperative for healthcare professionals to maintain vigilant monitoring of patients undergoing sodium valproate treatment, specifically for the risk of hyponatremia and its associated complications. Early identification and timely intervention are crucial in mitigating the risk of severe neurological consequences that may arise from electrolyte imbalances. Furthermore, it is vital to educate patients about the potential signs and symptoms of hyponatremia, enabling them to seek help promptly. This proactive approach not only enhances patient safety but also optimizes therapeutic outcomes in the management of epilepsy, reinforcing the need for comprehensive care strategies in clinical practice.

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Ethical Considerations
Ethical approval is not required for case reports at our institution. However, the authors obtained written informed consent from the patient for the publication of this report, ensuring that all identifying details have been omitted in accordance with the patient's preferences.

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Contribution to authors:

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Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Consent form was taken from the legal guardian of patient.

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