International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 09, Issue 03, March 2024,
https://doi.org/10.23958/ijirms/vol09-i03/1839

Case Report

Thyroid Troubles Unveiled: A Rare Case of Hyponatremia Secondary to Hypothyroidism

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Received 13 February 2024; Accepted 27 February 2024; Published 02 March 2024

Abstract

Thyroid hormones, produced by the thyroid gland, play various roles in the body. Essential for fetal development. There are many complications, one of which is rare: hyponatremia, an electrolyte imbalance characterized by low levels of sodium in the body. We present a case of a 69-year-old man who arrived at the emergency department after falling from the sofa and experiencing subsequent memory loss. The sodium level upon arrival was 114 mmol/L. After ruling out other potential causes of hyponatremia, the final diagnosis was hypothyroidism. After treating hypothyroidism, the sodium level began to rise again. It is essential to check thyroid function when a patient with low sodium and clinical symptoms of altered mental status is admitted to the hospital.

Keywords: ***hyponatremia, hypothyroidism, fall, altered mental status, case reports.***

Introduction

The production of thyroid hormone by the thyroid gland is essential for regulating metabolism, growth, and other bodily functions [1]. Thyroid hormones are essential for the growth of a fetus, as they initiate the development of specific processes in the fetal brain and somatic tissue. Thyroid hormones generally help regulate the weight of the fetus in early gestation [2]. Thyroid hormones also play a crucial role in the development of the kidneys [3]. Hyponatremia can sometimes be caused by low thyroid hormone levels; therefore, it is essential to consider thyroid evaluation for patients with hyponatremia [4]. We present a case of a 69-year-old man who presented at the emergency department with altered mental status and hyponatremia (114 mmol/L).

Case presentation

A 69-year-old man presented to the emergency department after experiencing a sudden fall at home. The patient was sitting on the sofa, and when he attempted to stand up, he collapsed on the floor. The patient has no recollection of the events that occurred in the hospital. He has been diagnosed with carcinoma in the upper lobe of the left lung and is currently undergoing chemoimmunotherapy. Additionally, he has hypertension, dyslipidemia, macular degeneration, and anemia.

Upon arrival, the patient's vital signs were as follows: a heart rate of 89 bpm, a respiratory rate of 8 breaths per minute, oxygen saturation in room air of 98%, a blood pressure of 147/82 mmHg, and a temperature of 36.4 °C. Normal saline was administered at a rate of 50 ml/hr, while hypertonic saline at 3% was administered at a rate of 20 ml/hr. Additionally, a complete blood count, electrolyte panel, coagulation panel, renal function test, liver function test, random cortisol, and glucose were ordered as initial diagnostic tools. None of the lab results were significant except for a low sodium level of 114 mmol/L, a low potassium level of 3.2 mmol/L, a low chloride level of 80 mmol/L, and a plasma osmolality of 238 mOsmol/kg.

After stabilizing the patient, he was transferred to the intensive care unit. A CT scan of the head was ordered to rule out any trauma, and it revealed a left-sided frontal hematoma, which did not contribute to the diagnosis. A thyroid function test was ordered, revealing a TSH level of 85.488 uIU/mL, which is very high, and a free thyroxine level of 1.59 pmol/L, which is low. The patient's diagnosis was made by examining thyroid levels, which revealed hyponatremia caused by hypothyroidism. When hypothyroidism was treated with oral thyroxine, the sodium level gradually began to rise. By day 3, the sodium level had reached 132 mEq/L. Head trauma was caused by hyponatremia, and the patient experienced a syncope episode.

After ruling out potential causes of hyponatremia such as mineralocorticoid deficiency, polyuria, and bleeding or hemorrhage, we concluded that hypothyroidism is the underlying cause of hyponatremia in this patient.

Table 1: Electrolyte and Hormone panel

Laboratory Investigation	Result	Reference Range
Sodium	114 mmol/L	135-145 mmol/L
Potassium	3.2 mmol/L	3.5-5.0 mmol/L
Chloride	80 mmol/L	98-107 mmol/L
Plasma Osmolality	238 mOsmol/kg	275-295 mOsmol/kg
Thyroid Stimulating Hormone (TSH)	85.488 ulU/mL	0.3-4.2 ulU/mL
Free Thyroxine (T4)	1.59 pmol/L	9.0-19.0 pmol/L

Discussion

The thyroid gland produces hormones, primarily thyroxine (T4) and triiodothyronine (T3), which play a crucial role in regulating metabolism [1]. Thyroid hormones influence the kidneys' sensitivity to antidiuretic hormone (ADH), regulating water excretion. In hypothyroidism, thyroid hormones are deficient. Reduced levels of thyroid hormones result in decreased kidney responsiveness to ADH. The impaired response to antidiuretic hormone (ADH) affects the regulation of water excretion by the kidneys [2]. Hypothyroidism can lead to decreased renal blood flow and glomerular filtration rate. Decreased renal function leads to increased reabsorption of salt and water in the kidneys [3]. Impaired renal function, combined with reduced ADH sensitivity, results in increased retention of salt and water in the body. The retained fluids contribute to dilutional hyponatremia, in which the sodium concentration in the blood becomes lower than normal [5].

In severe cases of hypothyroidism, a condition called myxedema may occur. Myxedema is characterized by the accumulation of mucopolysaccharides in the skin and soft tissues, resulting in swelling [4]. Fluid retention associated with myxedema can exacerbate hyponatremia. Symptoms of hypothyroidism may include fatigue, weight gain, intolerance to cold, and dry skin. Hyponatremia symptoms can include nausea, headache, confusion, and, in severe cases, seizures or coma. Diagnosis involves blood tests to measure thyroid hormone levels and sodium concentration [4]. Thyroid hormone replacement therapy is the main treatment for hypothyroidism. Correcting thyroid hormone levels often leads to normalizing water balance and sodium levels. Monitoring and managing hyponatremia may require adjustments in fluid and salt intake.

It is important to recognize that not all cases of hypothyroidism lead to hyponatremia. The severity of hyponatremia can vary among individuals, and prompt medical attention is crucial for accurate diagnosis and management [4]. We have determined that the majority of cases of hyponatremia are linked to primary hypothyroidism. Elevated TSH levels, as observed in our case, have been directly associated with a decrease in sodium levels. Consequently, after ruling out other potential causes of hyponatremia, it can be inferred that hypothyroidism is one of the contributing factors to this condition.

Conclusion

This case report emphasizes the importance of checking thyroid levels when a patient presents with low sodium levels and clinical symptoms of altered mental status, as illustrated in the aforementioned case. A comprehensive history and physical examination, along with a complete laboratory work-up, are crucial for identifying the underlying causes of hyponatremia. Due to the diverse manifestations of hyponatremia, doctors must maintain a high level of suspicion to ensure a prompt diagnosis and appropriate care.

Conflict of Interest

The authors declared they do not have anything to disclose regarding conflicts of interest with respect to this manuscript

Ethics approval and consent to participate

Not Applicable

Funding Statement

No funding was received.

Data Availability

A data availability Regarding this case report can be accessed upon request to Corresponding Author (Jafrin Sadiq Abdul Razack)

Authors' contributions

JSAR, SJH, SKA, SAA, and ME analyzed and interpreted the patient data regarding case presentation. JSAR was a major contributor in writing the manuscript. SJH analyzed and writing under literature part of the case report. All authors read and approved the final manuscript."

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