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Thyroid storm presenting with severe hypoglycemia: a case report

ABSTRACT

We present a case of thyroid storm with severe hypoglycemia in an elderly woman with a known history of type 2 diabetes mellitus and hyperthyroidism. Our case report highlights the need for prompt diagnosis and treatment of thyroid crisis and also to make the clinician aware of the possibility of an extremely rare and unlikely association between thyroid crisis and severe hypoglycemia. To the best of the author's knowledge, such a rare case is reported for the first time in Indian literature. (*Clin Diabetol* 2022, 11; 1: 57–59)

Keywords: hypoglycemia, thyroid crisis, thyrotoxicosis, type 2 diabetes

Introduction

A thyroid storm, also known as “thyroid crisis”, is a rare life-threatening manifestation of thyrotoxicosis characterized by exaggerated symptoms [1]. The exact incidence of this condition is difficult to approximate on account of its rare occurrence. Nationwide surveys in Japan revealed a mortality rate of > 10%, with an estimated incidence of 0.20/100 000/year in hospitalized patients [2]. In the US, the incidence of thyroid storms between 2004 and 2013 ranged from 0.57 to 0.76 cases/100 000 persons/year, with an incidence of 4.8–5.6/100 000 hospitalized patients/year. Females have a higher preponderance towards thyroid storm, with all age groups being affected [3]. Predisposing

factors leading to thyroid crisis encompass abrupt discontinuation of anti-thyroid agents, surgery, trauma, acute illnesses like infections, diabetic ketoacidosis, acute myocardial infarction, cerebrovascular accident, cardiac failure, drug reaction, parturition, recent use of iodinated contrast medium, radioiodine therapy, burns, stroke, side effects to certain medications (e.g. amiodarone, anesthetics, salicylates) but, can also occur without an apparent cause [4, 5]. A thyroid storm might result in multiple organ failure as the body is overwhelmed by excess thyroid hormone and makes an effort to compensate for the condition [6].

We present here a unique case of a woman with a known history of long-standing type 2 diabetes and hyperthyroidism who presented with severe hypoglycemia requiring hospitalization. The presence of manifestations of very severe thyrotoxicosis led us to suspect a thyroid storm.

Case report

A 67-year-old female, known case of type 2 diabetes mellitus (10 years) and hyperthyroidism (2 years), presented with extreme exhaustion, drowsiness, confusion, and abnormal behavior while on regular treatment with glimepiride 2 mg, metformin 1000 mg daily, and carbimazole 5 mg thrice daily. Precipitating and predisposing factors for hypoglycemia such as poor food intake, vomiting, renal impairment, and excessive physical activity were absent. Physical examination in the clinic revealed tachycardia (pulse, 130 beats/min) and mild hypertension (blood pressure, 140/94 mmHg). A glucometer reading showed her random capillary glucose level as 39 mg%, for which she was immediately administered 6 teaspoonfuls of oral glucose.

The patient was immediately hospitalized, oral anti-diabetic agents were withdrawn and 100 mL of 25% glucose as an intravenous (i.v.) bolus followed by

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Table 1. Patient's thyroid profile at admission

Thyroid function test	Values	Reference range
TSH (mU/L)	< 0.001	0.45–4.5
Free T3 (ng/mL)	2.12	0.87–1.78
Free T4 (mcg/dL)	22.52	5.92–13.29

T3 — triiodothyronine; T4 — thyroxine; TSH — thyroid-stimulating hormone

an infusion of 5% glucose at 50 mL/hr for 5 hours were initiated. At baseline, a laboratory reading of random plasma glucose was 41 mg%, while her renal and hepatic functions, complete blood count, urine routine, electrolytes, calcium, and phosphorus levels were within normal limits. An electrocardiogram confirmed sinus tachycardia. The patient was started on metoprolol 25 mg twice daily to control tachycardia and blood pressure, and the dose of carbimazole was doubled to 10 mg thrice daily; hydrocortisone was started at 100 mg i.v. per 8 hours. The thyroid function test report, available after 2 days, confirmed severe thyrotoxicosis (Tab. 1).

Though the patients' hypoglycemia resolved quickly and did not recur, her exhaustion, confusion, and irritability improved only after 72–96 hours. The next morning her blood pressure (160/90 mmHg) and pulse rate (150 beats/min) kept rising. She continued to have varying degrees of sinus tachycardia; the highest pulse rate recorded was 183 beats/min, while in sinus rhythm. Her arterial blood gases revealed acidosis for which a bolus of 100 cc soda bicarbonate was administered intravenously.

Since the patient did not respond to carbimazole, oral propylthiouracil 200 mg stat, followed by 100 mg thrice daily was initiated on the third day. Since propylthiouracil acts faster and has the ability to reduce peripheral conversion of thyroxine (T4) to triiodothyronine (T3), we considered it as a replacement for carbimazole. Additionally, oral Lugol's Iodine, 6 drops stat, was added followed by 2 drops thrice daily. She also experienced a short spell of atrial fibrillation with a rapid ventricular rate. During hospitalization, she experienced three febrile episodes with temperatures ranging between 100°F and 101°F, without any focus on infection detected clinically or on routine investigations. Even though the patient did not reveal any previous history of coronary artery disease, her 2D echocardiogram showed reduced left ventricular ejection fraction ([LVEF], 35–40%) and Grade I left ventricular diastolic dysfunction. Frusemide was given in a bolus dose of 40 mg i.v. followed by 20 mg orally once daily.

After a stormy period of about 96 hours, the patient's condition gradually improved. She did not

require invasive ventilatory support. Hydrocortisone and Lugol's Iodine were tapered off, and the patient was discharged after 10 days.

Discussion

The findings of our case are consistent with the criteria put forth by Burch and Wartofsky [7] and the updated criteria for thyroid storm defined by the Japanese Thyroid Association [8]. Our patient presented with confusion and abnormal behavior as a central nervous system manifestation and tachycardia; hyperthermia and digestive symptoms were not observed at the time of presentation. However, the patient later developed three febrile episodes. The extreme rarity of the association between thyroid storm and severe hypoglycemia and the need for stressing on close monitoring of glycemic status in patients presenting with severe hyperthyroidism prompted us to publish the case report.

The occurrence of thyroid storm with hypoglycemia is a rare phenomenon. As per our knowledge, only 4 such cases have been published to date. In these case reports, anorexia, precipitation of cardiac failure or hepatic insufficiency [9, 10], and lactic acidosis⁶ were identified as predisposing factors towards the development of hypoglycemia. We postulate that our patient probably had incipient cardiac failure as she responded to furosemide. We could diagnose thyroid storm as the patient had exaggerated symptoms of thyrotoxicosis.

It is necessary to consider a diagnosis of thyroid storm earlier, especially in patients with type 2 diabetes. Blood glucose levels should be checked in patients with thyroid crises, particularly when heart failure is involved. There is a need to pay close attention to glucose levels in the course of hyperthyroidism. This patient survived the thyroid storm on account of prompt diagnosis and treatment.

Conclusions

We believe that this report will help clinicians to pick up cases of thyroid crisis and initiate prompt treatment to curb mortality. It will also help clinicians to pick up rare cases of severe hypoglycemia, as seen in our patient, which itself carries higher morbidity and mortality. This is likely to be missed as thyroid crisis is usually associated with hyperglycemia.

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Conflict of interests

None declared.

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