



Emotional Stress-Induced Thyroid Storm

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Abstract

Thyroid storm is an endocrine emergency with high mortality due to severe uncontrolled thyrotoxicosis, often associated with precipitating factors. The chance of survival will increase with early suspicion, prompt diagnosis, and immediate treatment. In this case report, we are presenting a 49-year-old female who came to the emergency department with acute pulmonary edema, agitation, severe tachycardia, high-grade fever with uncontrolled thyrotoxicosis. A diagnosis of thyroid storm was made. The patient presentation was following severe emotional stress after the passing of her mother-in-law. In the literature review, only a few cases reported as emotional stress induced thyroid storm, and we would like to present this life-threatening endocrine emergency.

Keywords

- emergency
- emotional stress
- thyroid storm
- thyrotoxicosis

Introduction

Thyroid storm is a rare, life-threatening endocrine emergency characterized by severe clinical features of thyrotoxicosis.¹ A retrospective study of thyrotoxicosis hospital discharges in the United States showed 16% of inpatients with thyrotoxicosis were diagnosed with storm.² The overall mortality rate of thyroid storm is ranging from 10 to 30% worldwide.³

Thyroid storm may be precipitated by an acute event such as thyroid or nonthyroidal surgery, trauma, infection, an acute iodine load, noncompliance to treatment, or parturition.³ So, thyroid storm is caused by a precipitating event. Although rare, emotional stress is reported as an isolated trigger without other precipitating triggers.⁴

In this report, we are reporting a 49-year-old female who was presented with a thyroid storm from emotional stress after the passing of her mother-in-law.

Case Report

A 49-year-old female presented to Suhar Hospital emergency department with acute severe shortness of breath. On examination, she was agitated with severe respiratory distress, and her oxygen saturation was 60% in room air. The blood pressure was 210/110 mm Hg, pulse rate 150 beats per minute, temperature 39.1°C, and her chest was full of crepitation. The initial investigations revealed white blood cell count $15.5 \times 10^3/\mu\text{L}$, electrocardiography: sinus tachycardia without any ischemic changes, chest X-ray: bilateral pulmonary congestion, and echocardiography: global hypokinesia with low ejection fraction (35–40%). A diagnosis of acute pulmonary edema was made. The patient was intubated immediately and admitted to the intensive care unit, started her on glyceryl trinitrate infusion and furosemide infusion and kept her under monitoring. This short presentation of the patient happened within the first 2 days after her mother-in-law passed away.

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The next day, the patient's chest crepitation almost disappeared. It was decided to stop the glyceryl trinitrate infusion and furosemide infusion, but noted that the patient still had sinus tachycardia (pulse rate 157 beats per minute), and high-grade fever (temperature 39.1°C) in addition to agitated state.

While reviewing the patient's records, it was noticed that she was diagnosed with thyrotoxicosis 9 months ago, with initial free thyroxine (free T4) 64 pmol/L (reference range, 12-22), free triiodothyronine (free T3) 13 pmol/L, (reference range, 3.1-6.8), and thyroid-stimulating hormone (TSH) less than 0.005 uIU/mL (reference range, 0.27-4.2) and managed with carbimazole 10 mg/8 hours and propranolol 40 mg/12 hours, but unfortunately, the patient was not compliance to treatment and took carbimazole 10 mg once daily. In view of such a history of thyroid problem, a thyroid panel was sent, and the laboratory results showed free T4 48.59 pmol/L, free T3 19.64 pmol/L, and TSH less than 0.005 uIU/mL. Such an overall picture of acute pulmonary edema, agitation, severe tachycardia, high-grade fever with uncontrolled thyrotoxicosis raised the suspicion of thyroid storm.

According to the Burch and Wartofsky scoring system, a score of 45 or more is highly suggestive of thyroid storm; thus, the patient met the criteria with a score of 80 (→Table 1).⁵

The management started immediately with propylthiouracil 200 mg/4 hours, propranolol 40 mg/6 hours, and hydrocortisone 200 mg as a stat, then 100 mg/6 hours. The Lugol's iodine was not available to be given. Following 3 days of starting the therapy, there was significant improvement in the patient's condition; she became afebrile with normal pulse rate and clear chest. The repeated echocardiography showed improvement in the ejection fraction to 55%. The patient was extubated at that time. The serial thyroid panel showed significant improvement after 2 weeks of the therapy with free T4 26.23 pmol/L, free T3 6.49 pmol/L, while the TSH remained suppressed. Further laboratory results revealed a positive thyrotropin receptor antibody 35.17 IU/L, and thyroid ultrasound showed multiple small nonsuspicious hyperechoic round nodules, the largest at the right lobe measured 9 × 5.5mm.

After 3 weeks in the hospital, the patient was discharged. She was on carbimazole 10 mg/12 hours and propranolol 40 mg/12 hours and was given an appointment for thyroid uptake scintigraphy. Based on the result, we might proceed for radioactive iodine therapy.

Discussion

The thyroid storm is a life-threatening complication of thyrotoxicosis with high mortality rate.⁶ There are few reported cases in the literature that mentions emotional stress being a risk factor for thyroid storm.⁴ The progression of thyrotoxicosis to thyroid storm cannot be predicted.⁷

According to the Burch and Wartofsky scoring system, the most widely used scoring system for the diagnosis, the thyroid storm can be manifested with fever, gastrointestinal or hepatic dysfunction (nausea, vomiting, diarrhea, abdominal pain, and jaundice), central nervous system dysfunction (agitation,

Table 1 Scoring system to diagnose thyroid storm^a

Thermoregulatory dysfunction, temperature (°F / °C)	Point
99.0–99.9 / 37.2–37.7	5
100.0–100.9 / 37.8–38.2	10
101.0–101.9 / 38.3–38.8	15
102.0–102.9 / 38.9–39.4	20 ^b
103.0–103.9 / 39.5–39.9	25
≥ 104.0 / 40	30
Central nervous system dysfunction	
Mild (agitation)	10 ^b
Moderate (delirium, psychosis, extreme lethargy)	20
Severe (seizures, coma)	30
Gastrointestinal dysfunction	
Moderate (diarrhea, nausea/vomiting, abdominal pain)	10
Severe (unexplained jaundice)	20
Cardiovascular dysfunction: tachycardia, beats/min	
90–109	5
110–119	10
120–139	15
≥ 140	25 ^b
Atrial fibrillation	10
Heart failure	
Mild (pedal edema)	5
Moderate (bibasilar rales)	10
Severe (pulmonary edema)	15 ^b
Precipitating history	
Negative	0
Positive	10 ^b

^aA score ≥ 45 is highly suggestive of thyroid storm. A score of 25 to 44 supports the diagnosis of thyroid storm. A score 25 is unlikely to be thyroid storm. Adapted from Burch and Wartofsky.⁵

^bPatient's score.

delirium, psychosis, seizure, and coma), and cardiovascular system dysfunction (tachycardia, arrhythmias, and congestive heart failure).⁵ There is another scoring system by the Japan Thyroid Association and Japan Endocrine Society that also fits the criteria for our patient.⁸ Presence of tachycardia and central nervous system dysfunction are the most important differentiating points between thyrotoxicosis and thyroid storm.⁹

The levels of thyroid hormones do not correlate with the severity of thyroid storm. Thus, the degree of hyperthyroidism is not a criterion for the diagnosis of thyroid storm.⁶

In this case report, the previous patient's poorly controlled thyroid status was responsible for the clinical presentation, and the diagnosis of the thyroid storm, precipitated by emotional stress was made.

The management includes uses of antithyroid medications, in addition to thioamides, Lugol's iodine may be given to reduce thyroid hormone production. The use of propranolol (nonselective beta-adrenergic blockers) is of value to control the tachycardia, and it is crucial to ensure hemostasis by intravenous fluid hydration. Glucocorticoid is given to inhibit conversion of thyroxine (T4) to triiodothyronine (T3).¹⁰

In our case, we used propylthiouracil and we followed the patient by monitoring the liver function test for hepatotoxicity and complete blood count for agranulocytosis.

In severe cases of thyroid storm that are not responding to aggressive treatment, the plasma pheresis, charcoal, resin hemoperfusion, or plasma exchange can be used to remove excessive thyroid hormones from the body.¹¹ In our case, such treatment options were not required.

Conclusion

In this case, we advise that the clinicians should be aware of the underlying emotional stress as an important risk for the development of thyroid storm in the absence of other precipitating factors; also aggressive treatment is very important to limit the mortality and morbidity related to the thyroid storm.

Informed Consent

Authors declare that informed consent was obtained from the patient for publication on anonymous basis. All efforts are made to secure confidentiality of the patient.

Compliance with Ethical Principles

No ethical approval is required.

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None.

Conflict of Interest

None declared.

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