

Thyroid Storm: Uncommon Presentation

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Thyroid storm could lead to mortality; it is rare and characterized by severe clinical manifestations of thyrotoxicosis, multiple organ dysfunction result from failure of the compensatory mechanisms of the body. The diagnosis is clinical and it usually manifests by malignant hyperthermia, tachycardia, GI and neurological manifestations; the mortality is very high in spite of appropriate management.

We report a fifty-year-old Bahraini female who presented to Emergency Medicine department with palpitation, vomiting and diarrhea, as well as symptoms of lower respiratory tract infection. A provisional diagnosis of thyroid storm was made. The case was treated in ICU by mechanical ventilation and conservative supportive treatment. The patient recovered uneventfully.

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INTRODUCTION

Thyroid storm (TS) is a life-threatening condition. Its incidence is poorly defined and few series are available. A study in Japan to evaluate the incidence of the disease found that it is less than 0.20 in 100,000 per year among the hospitalized patients¹. TS is a life-threatening disorder with more than 10% mortality¹.

An acute event such as thyroid or non-thyroidal surgery, trauma, infection, an acute iodine load or parturition could precipitate thyroid storm. It might also develop in patients with long-standing untreated hyperthyroidism including Graves' disease, toxic multinodular goiter, solitary toxic adenoma and diabetic ketoacidosis (DKA)^{2,3}.

TS is usually a clinical diagnosis. A few scoring systems have been published but not widely used in the clinical area. Burch and Wartofsky is the most commonly used scoring system which is based on accumulative points including the presence of symptoms, which might suggest CNS, cardiac and GI involvement⁴. The main drawback of that system, the criteria include non-specific and the diagnostic scheme is complex. In 2012, LIT criteria 1 and 2 were developed for 2 grades of TS based on nationwide survey in Japan¹.

There is no definitive investigation to confirm the diagnosis; thyroid function test could support the diagnosis, which is useful only if the patient has not been previously diagnosed. CBC may show leukocytosis with shift to the left due to the disease itself or to the associated infection; LFTs commonly reveal non-specific abnormalities such as elevated levels of ALT, AST, ALP and serum bilirubin. Thyroid nuclear study usually reveals increased T3 resin uptake and an increased 24 hours uptake, this test is not widely used because the result is delayed; therefore, unhelpful for immediate management of the patient.

TS management is mainly symptomatic; it is very important to correct the electrolytes, as well as to treat the cardiac arrhythmia, usually beta blocker is the drug of choice as it may also be used to minimize the sympathetic overactivity in such cases. Controlling hyperthermia may play an important role in decreasing the mortality rate⁵. Methimazole is the drug of choice to treat thyroid storm and Propylthiouracil and Radioactive Iodine can be used in some cases where Methimazole is contraindicated; also, Lugol's iodine (potassium iodide) and corticosteroid plays important role in the management⁶.

The aim of this report is to present a rare case of thyroid storm, which is difficult to diagnose clinically due to lack of well-established diagnostic criteria and to highlight the associated mortality.

THE CASE

A fifty-year-old female, not known to have any medical illness, presented to the emergency department in November 2012 with symptoms of upper respiratory tract infection, palpitation, vomiting, diarrhea, shortness of breath and decreased level of consciousness; the patient was immediately intubated and shifted to ICU.

The patient's vitals were as follows: heart rate 200 beats per minute, regular pulse, BP 130/80 RR 25 per minute, O₂ saturation 98%, RBS 20, Temperature 38. On examination, the patient was looking sick, GCS 9, dehydrated and pale, neck examination shows large hard goiter, mobile with no bruit over.

Her routine investigation showed TSH 0, T4 21, T4 9 and her WBC 11.6, ALT 364 ALP 143, the rest of her investigations including electrolyte, renal function, lipase and amylase were within normal ranges. Chest x-ray showed cardiomegaly with moderate right sided pleural effusion, see figure 1. ECG showed atrial flutter with variable block. Echocardiography revealed normal left ventricular cavity size with fair global systolic function, ejection fraction 52% and septal and inferior hypokinesia. Clinical impression of thyroid storm precipitated by chest infection was made.

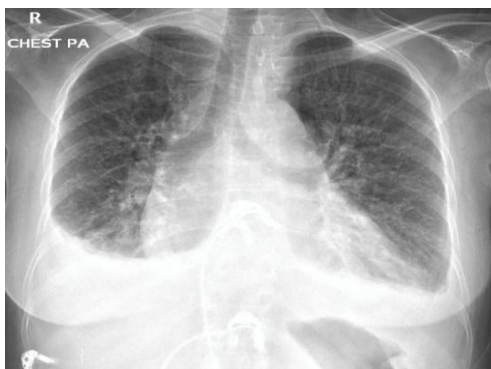


Figure 1: Right Sided Pleural Effusion

The patient was treated with Carbimazol 20 mg, Lugol's iodine and Propranolol 20mg, hydrocortisol 100 mg and meropenem. The patient level of consciousness decreased to GCS 3 during the interval of no sedation. CBC, RFT, LFT, electrolyte, blood, sputum, and urine

cultures. CT brain were normal, thyroid ultrasound showed multinodular goiter, see figures 2 and 3.

After the 7th day of ICU admission, the patient regained consciousness and the vital signs returned to normal. The patient was weaned from the mechanical ventilator. On the 10th day, she was transferred to general ward and was discharged after.

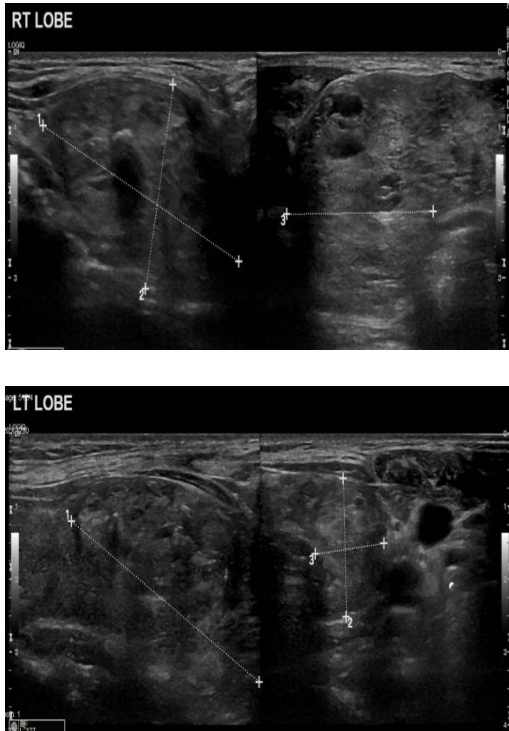


Figure 2 and 3: US Shows Enlargement with Nodularity of the Right and Left Lobes of the Thyroid

DISCUSSION

Thyroid storm prevalence is 0.22% of all patients with thyrotoxicosis, about 5.4% of them were already admitted to the hospital. A study in Japan to identify the epidemiological factors of the disease found that there is no difference in gender and age prevalence¹.

The diagnosis of such cases is based on the clinical criteria published by Burch and Wartofesky in 1993. A score of 45 or more is highly suggestive of thyroid storm; a score of 25–44 is suggestive of impending storm, and a score below 25 is unlikely.

The criteria include the following: (1) Thermoregulatory dysfunction ranges from 5-30 points based on the temperature. (2) Central nervous system effects range from 0-30 points based on level of consciousness. (3) Gastrointestinal-hepatic dysfunction ranges from 0-20 points based nausea, vomiting, diarrhea and jaundice. (4) Cardiovascular dysfunction ranges from 5-25 based on the rate of heart beat/minute (tachycardia). (5) Congestive heart failure ranges from 0-15 based on the presence of mild (pedal edema), moderate (bibasilar rales) or severe (pulmonary edema). (6) Atrial fibrillation ranges from 0-1 based on the presence or absence of atrial fibrillation. (7) Precipitating event ranges from 0-1 based on the presence or absence of the event.

Japanese criteria for thyroid storm (LIT-CRITERIA1 for TS1 and LIT-CRITERIA2 for TS2) include the presence of thyrotoxicosis (elevated free Triiodothyroine [T3] and/or thyroxine [T4] levels) and one of the following symptoms: central nervous system (CNS) manifestations, fever (38°C or higher), tachycardia (130 beats/minute or faster), congestive heart failure, gastrointestinal (GI) and hepatic manifestations.

Thyroid storm grade 1 (TS1) includes thyrotoxicosis and at least one CNS manifestation and fever or tachycardia or CHF or GI/hepatic manifestations, a-thyrotoxicosis and at least three combinations of fever or tachycardia or CHF or GI/hepatic manifestations.

Thyroid storm grade 2 (TS2) includes a-thyrotoxicosis and a combination of two, fever or tachycardia or CHF or GI/hepatic manifestations, b-patients who meet the diagnostic criteria for grade 1 except that serum FT3 or FT4 values are not available but whose data before or after the episode suggest that they are thyrotoxic at the time of thyroid storm.

Mortality rate among hospitalized patients is 10-20%. Among the etiological factors implicated is an increased sensitivity to catecholamines, endogenous and exogenous stress factors, which could initiate the thyrotoxic storm⁷.

CONCLUSION

We present a case of thyroid storm which was managed through mechanical ventilation and conservative medical management.

Thyroid storm is a very rare disease which could present by non-specific manifestations, and due to lack of well-established diagnostic criteria, achieving the diagnosis may be too late in some cases. Once the diagnosis is made based on the clinical judgment, the patient should be managed in ICU settings as the associated mortality and morbidity is very high.

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Competing Interest: None.

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REFERENCES

1. Akamizu T, Satoh T, Isozaki O, et al. Diagnostic Criteria, Clinical Features, and Incidence of Thyroid Storm Based on Nationwide Surveys. *Thyroid* 2012; 22(7):661-79.
2. Sherman SI, Simonson L, Ladenson PW. Clinical and Socioeconomic Predispositions to Complicated Thyrotoxicosis: A Predictable and Preventable Syndrome? *Am J Med* 1996; 101(2):192-8.
3. Osada E, Hiroi N, Sue M, et al. Thyroid Storm Associated With Graves' Disease Covered by Diabetic Ketoacidosis: A Case Report. *Thyroid Res* 2011; 4(1):8.

4. Burch HB, Wartofsky L. Life-Threatening Thyrotoxicosis. Thyroid Storm. *Endocrinol Metab Clin North Am* 1993; 22(2):263-77.
5. Kumar S, Moorthy N, Yadav S, et al. Thyroid Storm Presenting as Congestive Heart Failure and Protein-S Deficiency-Induced Biventricular and Internal Jugular Venous Thrombii. *J Postgrad Med* 2013; 59(3):229-31.
6. Kadmon PM, Noto RB, Boney CM, et al. Thyroid Storm in a Child Following Radioactive Iodine (RAI) Therapy: A Consequence of RAI versus Withdrawal of Antithyroid Medication. *J Clin Endocrinol Metab* 2001; 86(5):1865-7.
7. Karger S, Führer D et al. Thyroid Storm--Thyrotoxic Crisis: An Update. *Dtsch Med Wochenschr* 2008; 133(10):479-84.