

A Large Nationwide Survey of Patients Hospitalized with Thyroid Storm Has Been Used to Develop a Different Approach to Characterizing the Disease

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was forgiven if other data confirming the existence of thyrotoxicosis was present.

The authors compared the results of their “fever/tachycardia/GI/CHF with or without CNS” scoring method with the modified Wartofsky scoring system that sums up the numerical severity for each of five parameters—CNS manifestations, GI dysfunction, tachycardia, temperature, and CHF—plus gives an additional 10 points for atrial fibrillation or a precipitating event (1). (The total numerical score gives an estimate of the likelihood of storm: unlikely, impending, likely, or highly likely). Most of the “suspected” cases had a Wartofsky score in the “likely” range, and most of the “definite” cases were scored as “highly likely,” although there were some remarkably discrepant cases.

Results

As expected, the levels of TSH, FT₄ and FT₃ did not differ between control patients with hyperthyroidism and the 356 patients with definite or suspected storm. There were 38 deaths in total. Mortality in the 282 classified as definite storm was the same as in the 74 classified as suspected storm: about 10%. A cause of death was identified in 77% of patients; the most common cause in both definite and suspected storm was multiple organ failure (24%), followed by CHF (21%), respiratory failure (8%), arrhythmia (8%), disseminated intravascular coagulation (DIC; 5%), and GI perforation (5%). Multiple-logistic-regression

analysis indicated that patients who had multiple organ failure had a 10-fold increase in the risk of death, while those who either had shock or DIC had a 4-fold increase in the risk of death; again, there was no difference between definite and suspected cases. Triggering factors for storm were identified in 70%; the five commonest triggers were irregular use or discontinuation of antithyroid drugs (34%), infection (24%), and diabetic ketoacidosis, severe emotional stress, or trauma (3% each). Thyrotoxicosis had been present for less than a month before storm developed in about 45 patients, but storm also developed in patients in whom thyrotoxicosis had been present for decades. The mortality rate for patients with a bilirubin over 3 mg/ml was 32%, with multiple organ failure 24%, and with severe CHF 21%. Atrial fibrillation occurred in 38% of all patients with storm, but was present in almost 53% of fatal cases.

Conclusions

Simple regression analysis suggested that CNS manifestations and/or CHF might be associated with increased mortality, but multiple regression analysis did not confirm an association. Patients with multiple organ failure were 10 times as likely to die, and those with shock or DIC had a 4-fold increased risk of death. Perhaps a future prospective study using the diagnostic criteria outlined could help us make clinical decisions earlier, although the variety of possible associated diseases probably would hinder establishing standard clinical protocols.

ANALYSIS AND COMMENTARY ● ● ● ● ●

When one encounters a noncompliant patient with Graves’ disease who has marked tachycardia, diaphoresis, and nausea and diarrhea or who has a severe respiratory infection, signs of sepsis, heart failure, or mental changes, the safest thing to do is hospitalize the patient and provide empiric therapy. Not uncommonly, the patient will turn out to be “a tropical

depression” and not a full blown “storm,” but making a decision on hospitalization based on a point score or on the number of organ systems that show abnormalities remains a long way in the future.

The current study excluded any cases in which an underlying disease appeared to be responsible for fever (e.g., pneumonia), impaired consciousness

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(e.g., psychiatric or cerebrovascular disorders), heart failure (e.g., acute myocardial infarction), or liver failure (e.g., viral hepatitis or acute liver failure). However, such diseases clearly can trigger thyroid storm. The updated Wartofsky approach (1) indicates that when it is not possible to distinguish whether a finding is due to an intercurrent illness or to thyrotoxicosis, the higher point score is given so as to favor empiric therapy. In addition to the stringency of the selection criteria in the current study, its spectrum of cases may differ from those in other parts of the world, since Japan has a high level of dietary iodine intake, while toxic nodular goiter is rare. The authors required documentation of serum FT₃/FT₄ levels to prove thyrotoxicosis, but severe illnesses are well known to reduce T₃ levels, and patients with thyroid storm who are already receiving antithyroid drugs

could have been excluded. It is interesting that a single cutoff value of a temperature over 38°C (which isn't that uncommon in patients with garden-variety Graves' disease) was useful, while only the most severe grade of CHF was useful in distinguishing cases of storm, and that atrial fibrillation, abdominal pain, and agitation were not useful. Finally, the division of cases into definite and suspected seems to have been relatively unrewarding, since both groups had the same mortality rate. This ambitious and exciting study extends hope not only for prospective studies, but also for studies on organ-specific toxicities of thyroid hormones and for cooperative clinical studies to analyze the tsunami of cytokines and chemokines that doubtless occur in these unusual patients.

— Stephen W. Spaulding, MD

REFERENCES

1. Wartofsky L. Thyrotoxic storm. In: Braverman L, Utiger R, eds. *Werner and Ingbar's The thyroid: a fundamental and clinical text*. 9th ed. Philadelphia: Williams & Wilkins, 2005:651-7.