Thyroid Storm

Clinical Recognition

Thyroid storm is the name given to an acute, life-threatening exacerbation of thyrotoxicosis. Thyroid storm in the past most frequently occurred after surgery for thyrotoxicosis, now an infrequent ocurrence, because of earlier diagnosis and treatment of thyrotoxicosis, and better pre- and postoperative medical management. However acute exacerbation of thyrotoxicosis typically caused by inter-current illness, especially infections, and trauma such as operation, still occur. Occasionally it occurs as a manifestation of untreated or partially treated thyrotoxicosis without other apparent precipitating factor. Storm is typically associated with Graves' disease, but it may occur in patients with toxic nodular goiter.

Classic features of thyroid storm are severe exacerbation of thyrotoxicosis, with fever, marked tachycardia,heart failure, tremor, nausea and vomiting, diarrhea, dehydration, restlessness, extreme agitation, delirium or coma. Fever is typical and may be higher than 105.8 F (41 C). Patients may present with a true psychosis or a marked deterioration of previously abnormal behavior. Rarely thyroid storm takes a strikingly different form, called apathetic storm, with extreme weakness, emotional apathy, confusion, absent or low fever

Signs and symptoms of decompensation in organ systems may be present. Delirium is one example. Congestive heart failure may also occur, with peripheral edema, congestive hepatomegaly, and respiratory distress. Marked sinus tachycardia or tachy-arrhythmias, such as atrial fibrillation, are common. Liver damage and jaundice may derive from congestive heart failure or a direct action of thyroid hormone on the liver coupled with malnutrition Fever and vomiting may produce dehydration and prerenal azotemia. Abdominal pain may be a prominent feature. The clinical picture may be masked by a secondary infection such as pneumonia, a viral infection, or infection of the upper respiratory tract. Death may be caused by cardiac arrhythmia, congestive heart failure, hyperthermia, or other unidentified factors.

In the past, death was the usual final outcome of thyroid storm. These patients typically were malnourished, had severe thyrotoxicosis, and had coincident serious disease, such as heart failure. Although still life-threatening, death from thyroid storm is rarer if it is promptly recognized and aggressively treated in an intensive care unit, but may still approach 10%.

In Nelson and Becker's series reported in 1969 (2) , there were 21 cases of thyroid storm among 2,329 admissions due to thyrotoxicosis (about 1%). Other series, which included all cases with fever of 38.3 C or more in the postoperative period, reported an incidence of thyroid storm as high as 10% of patients operated on (3). Few patients are now seen with the classic pattern of thyroid storm, but patients are occasionally encountered with marked accentuation of symptoms of thyrotoxicosis in conjunction with infection. Death may be from cardic failure, shock, multiple organ failure or other complications.

Pathophysiology

Thyroid storm classically began a few hours after thyroidectomy performed on a patient prepared for surgery by potassium iodide alone. Many such patients were not euthyroid and would not be considered appropriately prepared for surgery by current standards. Exacerbation of thyrotoxicosis is still seen in patients sent too soon to surgery, but it is unusual in the antithyroid drug-controlled patient. Thyroid storm occasionally occurs in patients operated on for some other illness while severely thyrotoxic. Severe exacerbation of thyrotoxicosis is rarely seen following 131-I therapy for hyperthyroidism; but some of these may be defined as thyroid storm .

Thyroid storm appears most commonly following infection, which seems to induce an escape from control of thyrotoxicosis. Pneumonia, upper respiratory tract infection, enteric infections, or any other infection can cause this condition.. Interestingly, serum free T4 concentrations were higher in patients with thyroid storm than in those with uncomplicated thyrotoxicosis, while serum total T4 levels did not differ in the two groups (6) , suggesting that events like infections may decrease serum binding of T4 and cause a greater increase in free T4 responsible for storm occurrence.

Patients are routinely made euthyroid before thyroidectomy and often before 131-I therapy. Using thionamides preoperatively, thyroid glands have only minimal amounts of stored hormones, thus minimizing thyroid hormone release due to manipulation.. 131-I is increasingly being used as a first-line treatment of hyperthyroidism, but thyroid storm is rarely seen after this treatment, due to adequate medical pretreatment, and only isolated cases have been reported.

Diagnosis and Differential

Diagnosis of thyroid storm is made on clinical grounds and involves the usual diagnostic measures for thyrotoxicosis. **The central features are thyrotoxicosis, abnormal CNS function, fever, tachycardia (usually above 130bpm),GI tract symptoms, and evidence of impending or present CHF.** There are no distinctive laboratory abnormalities. Free T4 and, if possible, free T3 should be measured. Note that T3 levels mazy be markedly reduced in relation to the severity of the illness, as part of the associated “non-thyroidal illness syndrome. Electrolytes, blood urea nitrogen (BUN), blood sugar, liver function tests, and plasma cortisol should be monitored. While the diagnosis of Thyroid Storm remains largely a matter of clinical judgment, a point scale for assessing the severity of hyperthyroidism and judging the presence of storm, has been presented, and is referenced below.

Treatment

Thyroid storm is a major medical emergency that has to be treated. in an intensive care unit (Table 1).

Table 1. Treatment of Thyroid Storm