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Clinical Review

THYROID STORM IN A PATIENT WITH TRAUMA – A CHALLENGING DIAGNOSIS FOR THE EMERGENCY PHYSICIAN: CASE REPORT AND LITERATURE REVIEW

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Abstract—Background: Thyroid storm, an endocrine emergency, remains a diagnostic and therapeutic challenge. It is recognized to develop as a result of several factors, including infection, surgery, acute illness, and rarely, trauma. Recognition of thyroid storm in a trauma patient is difficult because the emergency physician usually focuses on managing more obvious injuries. **Objective of the Review:** We present a case of trauma-related thyroid storm and review the previous literature on posttraumatic thyroid storm to delineate risk factors of the disease. The case occurred in a 32-year-old man after a motorcycle accident. **Discussion:** Careful investigation of patient history and risk factors of trauma-related thyroid storms and utilization of the scoring system may facilitate early diagnosis. Traumatically induced thyroid storm usually responds to medical treatment developed for hyperthyroidism. Surgical intervention may be needed for patients who failed medical treatment or those with direct thyroid gland injuries. The outcome is usually fair under appropriate management. **Conclusion:** We present a case of trauma-related thyroid storm to illustrate the diagnostic and therapeutic approach with a summary of the previous literature. Emergency physicians should be aware of the clinical presentation and risk factors of patients with trauma-related thyroid storm to reduce the rate of

misdiagnosis and prevent catastrophic outcomes. © 2016 Elsevier Inc. All rights reserved.

Keywords—thyroid storm; trauma; emergency physician; risk factors; hyperthyroidism

INTRODUCTION

Thyroid storm, also known as thyroid crisis, is a rare complication of thyrotoxicosis. Despite early diagnosis, the overall mortality rate remains high at 10–30%. Four main features characterize the clinical scenario: altered mental status, hyperpyrexia, tachycardia, and gastrointestinal dysfunction. Thyroid storm is typically precipitated by several concomitant events such as infection, iodine-containing contrast agent use, medication, pregnancy, surgery, and acute illness. Trauma is a rare precipitating factor (1).

Recognition of thyroid storm in a trauma patient is a difficult task because the emergency physician usually focuses on managing more obvious injuries. The manifestations of thyroid storm, such as tachycardia or altered

consciousness, could be considered trauma-related. Careful investigation of patient history and alertness to risk factors of trauma-related thyroid storms may reduce the rate of misdiagnosis and prevent catastrophic outcomes.

In this study, we report a case of thyroid storm occurring after a motorcycle accident and the issues associated with its care, which occurred due to negligence in the awareness of the trauma-thyroid storm relationship. We also conducted a brief review of the literature focused on posttraumatic thyroid storm to delineate the risk factors.

CASE REPORT

A 32-year-old male motorcyclist, who used a helmet, presented to the emergency department after a road traffic accident. On arrival 30 min after the accident, the patient experienced severe agitation and diaphoresis. During the primary survey, he was found to have dyspnea, a respiratory rate of 35 breaths/min, a heart rate of 155 beats/min, and blood pressure of 138/94 mm Hg. The patient's Glasgow Coma Scale scores were as follows: eye, 4; verbal, 2; and motor, 4. His pupils were normal in size, equal, and reactive to light. The injuries noted were multiple abrasions over his face and all four limbs, and a deformity of the right lower limb. Radiographs detected closed fractures of the right distal tibia and fibula. An additional 1 L of crystalloid fluid was administered intravenously, without a response. Given the impression of traumatic hemorrhage, whole-body computed tomography was performed, but it revealed no abnormalities of the head, cervical spine, chest, or abdomen. When the patient returned from Radiology to the resuscitation room, he became increasingly agitated and exhibited tachypnea and tachycardia, eventually reaching a heart rate of 178 beats/min, blood pressure of 181/81 mm Hg, and tympanic temperature of 38.4°C. Due to his agitation and severe tachypnea, the patient was intubated with an endotracheal tube for airway protection. A chest radiograph, taken after intubation, revealed prominent hilar vessels and butterfly-like central pulmonary opacities bilaterally, consistent with pulmonary edema.

After a series of examinations and clinical management, hypovolemic shock was excluded. Further questioning of his family revealed that the patient had been diagnosed with thyrotoxicosis during a physical examination 1 year previously, but the patient denied using any medication or attending follow-up. Several weeks prior, he began to complain about mild diarrhea, palpitations, easy agitation, and heat intolerance. Thyroid storm was strongly suspected, and an endocrinologist was consulted immediately. Ultrasonography revealed a diffuse goiter with increasing vascularity but no hematoma (Figure 1). Thyroid storm was diagnosed using the Burch and

Wartofsky score (Table 1): the patient had a score of 85 (temperature = 15, delirium = 20, diarrhea = 10, tachycardia = 25, pulmonary edema = 15) (3). The patient was admitted to the surgical intensive care unit, and treatment was instituted according to the guidelines of the American Thyroid Association.

Initial thyroid function tests revealed the following data (normal values in parenthesis): free thyroxine (T4) level of 8.56 ng/dL (0.8–2 ng/dL), thyroid-stimulating hormone (TSH) level of < 0.03 μ IU/mL (0.25–5.0 μ IU/mL), and total triiodothyronine (T3) level of 491.39 ng/dL (100–190 ng/dL). After treatment with propylthiouracil, propranolol, hydrocortisone, and compound iodine solution, the patient's clinical status improved gradually. On day 11, he was successfully weaned from the ventilator and transferred to the general ward. The patient was discharged with neurologic sequelae, which required neuro-rehabilitation.

DISCUSSION

Thyroid Storm and Trauma Overview

Thyroid storm, which occurs in approximately 1–10% of inpatients with thyrotoxicosis, has been associated with diagnostic and therapeutic challenges in clinical practice since it was first characterized in 1926. It occurs more commonly in women and among patients with Graves' disease (4–6). Although the exact pathogenesis of thyroid storm is not definitive, numerous precipitating factors, namely infection, major trauma, surgery, parturition, diabetic ketoacidosis, vascular accidents, noncompliance with thyroid medication, iodine exposure from radiocontrast dyes, amiodarone exposure, and emotional stress, have been identified (1). Trauma is a rare cause that has previously been reported in the literature. In a recent nationwide survey of Japanese hospitals, trauma accounted for 3.9% of cases of thyroid storm (7). However, the symptoms of thyroid storm, which include altered consciousness, tachycardia, and hypertension, may puzzle clinicians when patients present with trauma. A delay in the diagnosis of thyroid storm is potentially catastrophic, as even early-diagnosed thyroid storm has an associated mortality rate of 10–30% (4). We conducted a brief review of the available literature, discussing the etiology, clinical presentation, diagnosis, treatment, and outcome of patients with posttraumatic thyroid storm.

After a brief review of the literature, we found 22 articles reporting cases of posttraumatic thyroid storm, which was first described by Jacobs in 1979 (5,8–28). For one article written in German, we used only the data reported in the abstract (12). Considering that some articles reported more than one case, and including the present patient, we analyzed information on 25

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