LUMEN ET VIRTUS

Case report – Thyrotoxic crisis

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ABSTRACT

Thyrotoxic crisis (TC) or Thyroid Storm, is a rare disorder. It represents an acute, life-threatening hypermetabolic state that is precipitated by excessive and inappropriate secretion of circulating thyroid hormones in patients with a clinical history of hyperthyroidism. It should be noted that Graves' disease is the most common cause associated with thyrotoxic crisis. The article presents a case report of a patient who abandoned treatment and was affected by thyrotoxic crisis. The objective of this article is to highlight the importance of regular treatment, as well as admission with appropriate medications in the intensive care unit (ICU). This is a medical emergency, so clinical diagnosis and early treatment are associated with a reduction in mortality. Thus, specific thyroid therapy is important, as well as support in an ICU.

Keywords: Thyrotoxic Crisis, Hyperthyroidism, Treatment, Diagnosis.

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INTRODUCTION

Thyrotoxic crisis (TC) or thyroid storm is a rare disorder and corresponds to a medical emergency. As for the mortality rate, it is around 10%. And it represents 1 to 2% of hospital admissions for thyrotoxicosis. Thus, it is evident that if it is not properly treated, the outcome can be fatal (VILAR, 2021).

TC represents an acute, life-threatening hypermetabolic state that is precipitated by excessive and inappropriate secretion of circulating thyroid hormones. It occurs in patients with known or unknown previous hyperthyroidism, without adequate treatment, who are subjected to acute precipitating events (VILAR, 2021).

The most common cause of hyperthyroidism is Graves' disease (GD), an autoimmune condition that occurs frequently in women. In addition, this comorbidity, when left untreated, is the main cause of TC cases in Brazil (REIS; CARVALHO, 2019). It is also worth mentioning that GD, according to studies in Japan, has an annual incidence of 20 to 50 cases per 100,000 people (SHARMA, 2019).

Regarding the clinical picture, due to the high levels of circulating hormones, there is an exacerbation of the symptoms of hyperthyroidism. And the classic manifestations of TC include fever, marked tachycardia, heart failure, tremors, nausea and vomiting, diarrhea, dehydration, restlessness, extreme agitation, delirium, or coma (VILAR, 2021).

The diagnosis of TC is clinical. Therefore, correlating the compatible clinical picture with the history of previous hyperthyroidism and/or ophthalmopathy and/or goiter are sufficient criteria to establish the diagnosis of TC and initiate treatment. The Burch and Wartofsky index comprises a useful tool, which helps and facilitates the prompt recognition of a severe thyrotoxic crisis (VILAR, 2021).

And yet, in large database studies in Japan, some factors were associated with a higher mortality rate, such as: advanced age, nervous system dysfunction, non-use of antithyroid drugs and beta-blockers, need for mechanical ventilation, hemodialysis, shock, and disseminated intravascular coagulopathy (GALINDO et al., 2019).

Thus, in view of the severity and rarity of TC in clinical practice, it is important to study this condition so that prompt recognition occurs in order to avoid a fatal outcome. Thus, through the reading of data from the medical records, the results of exams, obtaining information from the doctor, talking to the patient and reviewing the literature, the case of the individual E.L.S.

CASE REPORT

A 29-year-old female patient was admitted to the Emergency Room of the Joinville General Hospital, in Joinville, Santa Catarina, Brazil, due to symptoms of anorexia and body asthenia,

associated with tremor in the upper limbs. Related to the condition, the patient reported episodes of nodular prurigo and edema in the lower limbs. On physical examination, the patient was in regular general condition, dyspneic, pale, hydrated, anicteric, and afebrile (36.7º C). Cardiac auscultation showed a rate of 147-153 bpm, with a regular heart rhythm in 2 times, without murmurs. Pulmonary auscultation revealed a respiratory rate of 18-22 breaths per minute, with no adventitious sounds.

The rest of the physical examination showed a flaccid abdomen, positive bowel sounds (AHR), no visceromegaly or pain on palpation, blood pressure ranged from normal (120x70 mmHg) and hypertension (150/160 mmHg systolic) and SatO2 98%, lower limb edema +4/4+, presence of crusted lesions in both lower limbs (nodular pruritus), in addition to diffuse nodular goiter, thyroid painful on palpation and exophthalmos. Regarding health history, he reported hypertension in regular use of propranolol hydrochloride, 40 mg, and hyperthyroidism - caused by Graves' disease - in regular use of antithyroid drugs: methimazole, 10 mg, and prednisolone, 20 mg. However, the patient abruptly discontinued the drug methimazole two weeks ago.

According to the compatible clinical picture, associated with a history of hyperthyroidism and when evaluating the Burch and Wartofsky index (50 points), the condition was characterized as a thyrotoxic crisis. At the emergency room, an electrocardiogram was requested, which showed sinus tachycardia, however, without alterations for pathological arrhythmias or ischemic lesion current. In addition, the patient had an elevated FT4 (free thyroxine) with a value of 14.4ng/dL (up to 1.7ng/dL).

The patient was then admitted and a loading dose of hydrocortisone 300mg was started, followed by 100mg every 8 hours for maintenance, propranolol 60mg every 4 hours and propylthiouracil 1000mg was also given as a loading dose, followed by 200mg every 4 hours. After initial approach, the patient was referred to the ICU, the thyroid stimulating hormone (TSH) - during hospitalization - obtained a value of 0.01uIU/mL and the FT4 was elevated (7.77ng/dL. The patient remained in the ICU for 3 days. She was then transferred to the ward and followed up for another 3 days until she was discharged from the hospital.

DISCUSSION

Considering that thyrotoxic crisis is a rare disease that has a clinical diagnosis, it is essential for the physician to have knowledge and strict follow-up in relation to the patient's underlying disease (hyperthyroidism), that is, the signs and symptoms; the collection of data in the anamnesis, often related to lack of knowledge or abandonment of treatment, to identify whether it is regular or not; and, finally, the clinical reasoning process to assess the clinical exacerbation in hyperthyroidism, which within this context may culminate in TC (VILAR, 2021).

The clinical instability in patients affected by CT presents with significant cardiovascular instability, mainly. This is due to the enormous action of thyroid hormones in the cardiovascular

system. Based on this, it is important to point out that some of the precipitating factors of TC are: infections (most common), surgeries, anesthetic induction, iodine overload, pregnancy, and abrupt withdrawal of antithyroid medication. This last factor (abrupt withdrawal of medication) is the same as in the case referred to. However, the mechanisms responsible for the worsening of WA are not yet well understood. (VILAR, 2021).

Regarding the diagnosis of thyrotoxic crisis, this is imminently clinical. In patients with a compatible condition, a clinical history of hyperthyroidism - elevation of FT4 and/or free triiodothyronine (FT3) and suppression of TSH -, nodular goiter, or ophthalmopathy, it becomes easier to establish the diagnosis and start treatment (DIAS et al., 2022). That said, in the CT report, although the FT3 result was not obtained, the patient had a high FT4, a clinical history of hyperthyroidism associated with treatment abandonment, as well as a compatible clinical picture, for this reason an early diagnosis was made and treatment was initiated.

Another fundamental point is the evaluation of the clinical picture, using the Burch and Wartofsky index, which grades the severity of the manifestations, through thermoregulatory dysfunction (temperature), cardiovascular dysfunction (tachycardia), central nervous system dysfunction, congestive heart failure, gastrointestinal and hepatic dysfunction, atrial fibrillation, and presence or absence of triggering factor. The sum of points greater than or equal to 45 points is highly suggestive for TC; 25-44, suggests imminent CT; and, finally, a score lower than 25 points indicates TC as unlikely (KAHALY et.al., 2018).

As mentioned in the case presented above, the patient obtained a score of 50 points (highly suggestive for TC), since she presented cardiovascular dysfunction (tachycardia) with a frequency above 140 bpm (25 points); the positive triggering factor, that is, the abrupt withdrawal of the medication (10 points); congestive heart failure (peripheral edema) considered mild (5 points); and regarding the effects on the central nervous system, the following were considered mild: agitation (10 points). Based on this, treatment for the control of TC comes into play, which aims to stop the synthesis, release and peripheral effects of thyroid hormones, as well as to treat the trigger. To this end, it is necessary to use multiple medications associated with intensive care (BAHN, 2011).

That said, it should be noted that due to the high morbidity and mortality, research in Japan recommends a multimodal treatment that decreases morbidity and mortality rates and includes: intravenous methimazole or propylthiouracil (40 or 400mg every 8h), glucocorticoids (intravenous methylprednisolone 50mg), beta-blockers (propranolol 40mg every 6h) and monitoring in an intensive care unit (KAHALY et.al., 2018). In the case mentioned, propylthiouracil was given a loading dose of 1000 mg (blocking hormone synthesis) and maintenance of 200 mg orally every 4 hours (inhibiting the conversion of T4 into T3).

When considering the possible reduction in adrenocortical reserve and relative adrenal insufficiency, it is necessary to use glucocorticoids, which should be administered as prophylaxis in this case and for their inhibitory effects on the peripheral conversion of T4 to T3. The options are dexamethasone (2 mg, IV, every 6 hours) or hydrocortisone (loading dose, 300 mg, IV; maintenance dose, 100 mg, every 8 h). In the case above, hydrocortisone was used (VILAR, 2021).

It is worth noting that high doses of this medication are recommended at admission, if propylthiouracil is available, and thus it was performed in the aforementioned report. This is indicated because in addition to the medication inhibiting the thyroperoxidase enzyme and, consequently, the formation of new hormones in the thyroid, there is also a blockage of the peripheral hormonal conversion from its inactive form-T4 to the active-T3 form (KAHALY, et at., 2018).

After 1 hour of propylthiouracil administration, iodine should be administered, which can be through lugol's solution or concentrated potassium iodide, 5 drops orally (PO) every 6 hours, which causes the Wolff-Chaikoff effect, by inhibiting the release of hormones preformed by the follicular cell (SHARMA, 2019). However, Lugol was not administered to the patient in the referred case, in view of the lack of the drug in the hospital. Finally, it is important to note that if it is not possible to use Lugol, lithium carbonate is recommended at a dose of 300 mg, every 6 hours, PO (VILAR, 2021).

CONCLUSION

Taking advantage of the importance of specific treatment for clinical practice, as well as the severity and rarity of this manifestation, this research was carried out in the literature. Thus, it is important for multidisciplinary professionals to engage in the early recognition and specific treatment of TC in individuals affected by hyperthyroidism. In addition, the case report reinforces the diagnosis associated with treatment abandonment, the latter being the most common cause of decompensation for thyrotoxic crisis. In addition, studies show that adequate and early management drastically reduces mortality.

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