THYROTOXIC CRISIS IN A 75-YEAR-OLD WOMAN

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SUMMARY – A 75-year-old female patient was admitted to the Intensive Care Unit with the signs of thyrotoxic crisis. Although hyperthyroidism had been previously suspected, thyrosuppressive therapy was not initiated on time. This along with other adverse factors like acute urinary infection contributed to deterioration and unfavorable development of the disease. Clinical improvement was noticed 24 hours from the introduction of combined therapy with propylthiouracil, propranolol, hydrocortisone and cardiotonics for rapid atrial fibrillation caused by atherosclerotic and thyrotoxic heart, supplemented with sedatives and necessary medical care. Shortly upon normalization of the thyroid hormone levels, RJ therapy was administered as a final solution. Pancytopenia verified before the initiation of thyrostatic therapy also contributed to this solution. The intention of this case report is to point to the yet possible occurrence of thyrotoxic crisis, which is nowadays extremely rare owing to appropriate management of hyperthyroidism. Nevertheless, may the disease failed to be recognized on time and therapy is introduced too late, along with other unfavorable factors such as acute infection, the disease can still occur sporadically. Although the mortality rate has been drastically lowered, it is still rather high, i.e. about 7%, therefore these patients should be treated at intensive care unit.

Key words: *Thyroid crisis, diagnosis; Thyroid crisis, therapy; Hyperthyroidism, etiology; Case report*

Introduction

Thyrotoxic crisis is the very last and most severe stage of hyperthyroidism, which is clinically presented by excessive hypermetabolism. It is necessary to distinguish real thyrotoxicosis (which leads to thyroid storm) from destructive thyroid disease, when hormones are being released into the circulation from a damaged thyroid gland[1]. The combination of hypertyroidism and Addison's disease is an especially dangerous condition because of the impossibility of increased secretion of cortisol as stress hormone. The most common cause of thyrotoxic crisis is unrecognized disease or inappropriate treatment[1,2]. It usually occurs in patients who have some associated disorders, above all acute infections which can worsen thyrotoxicosis, surgery in these patients, RJ therapy in inappropriately prepared patients, and physical and psychologic exhaustion, in other words stress[1,8]. Nowadays it is assumed that several mechanisms contribute to the pathogenesis of thyrotoxic crisis, including high increase in thyroid hormones (especially T3), extreme adrenergic stimulation, and relative adrenal gland insufficiency that is 'sucking itself' because the patient is practically in 'flame' and 'is burning', i.e. in the state of high stress.

Extreme hyperpyrexia (over 40 °C) predominates in clinical presentation, which also includes tremor, nausea, vomiting, dehydration, diarrhea, prostration, central nervous system disturbances (agitation, somnolence, coma), and cardiovascular symptoms (tachycardia, rapid atrial fibrillation and congestive heart failure)[4,7].

The existence of so-called 'apathetic' type of the condition characterized by extreme weakness that can cause diagnostic difficulties should also be noted. The diagnosis of thyrotoxic crisis is based on clinical presentation and it is crucial to initiate therapy immediately, i.e. before

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hyperthyroidism is verified by laboratory testing (T3, T4 elevation, TSH decrease)[3,6].

The basic therapy combination consists of PTU, beta blockers, potassium iodide and glucocorticoids, leading to remarkable clinical improvement as early as 24-28 hours of therapy introduction (the supporting medical care also being of great importance). If there are no clinical signs of improvement 48 hours of therapy introduction, plasmapheresis can be performed[5].

Case Report

P. M., a 75-year-old woman, was admitted to the Intensive Care Unit of our University Department for elevated body temperature (39 °C), adynamia, weakness, prostration and tachycardia (HR=170) associated with hypertension (170/80 mm Hg), so she appeared to be a very seriously ill patient. Her health state had aggravated several days before hospital admission. Medical history and documentation showed that she had been hospitalized at the Split University Hospital 7 days before for bleeding ulcer, when thyroid hormone tests had been done for hyperthyroidism. These test results had not yet been available at the time of discharge from the hospital. Laboratory findings showed some pathologic values: increased erythrocyte sedimentation rate, pancytopenia (before thyrostatic therapy), electrolyte disbalance, borderline glucose increase, pathologic urine findings (abundant in bacteria) and rise in the level of fibrillation with increased fibrinolysis in coagulogram. Also, rapid atrial fibrillation with absolute ventricular arrhythmia (HR=170) with LVH and possible anterolateral ischemia was verified by ECG.

Chest x-ray showed a hypertonic shadow of the heart and cicatricial alteration in the left apex with no signs of acute heart failure or inflammatory infiltration. Since the symptoms of extreme thyrotoxicosis predominated the clinical picture, even without confirmation by laboratory findings, we immediately initiated the following therapy combination: propylthiouracil at a high dosage (150 mg every 6 hours), propranolol 120 mg *per* day, hydrocortisone 300 mg *per* day + cardiotonics parenterally and infusion. Two days of therapy initiation, the patient's mental state improved, she became afebrile, and the heart rate slowed down. In the meantime, laboratory findings of peripheral thyroid hormones were received confirming thyrotoxicosis: T3 5.4; T4 300; TSH <0.01.

Scintigraphy showed a normally shaped thyroid gland with intensive homogeneous activity. All this contributed to the diagnosis of hyperthyroidism. Ultrasonography revealed a slightly enlarged thyroid gland with markedly changed ultrasonographic structures. Hormone findings obtained after 10 days of therapy were normal: T3 1.2 and T4 120. Pancytopenia and leukopenia also improved: L 4.5 (initially 1.9). Then we used J 131 at a dosage of 5 mCI to achieve definitive recovery. The patient was administered cephalosporin antibiotics for urinary infection (*Escherichia coli* was isolated in urinary culture, $>10^6$), according to antibiogram report.

The patient was discharged from the hospital after one-month hospitalization, in a very good, satisfactory general condition.

Discussion

Although thyrotoxic crisis is now rarely encountered in practice, it may occur in case of unrecognized disease or inappropriate treatment along with unfavorable external factors[1,2]. In the present patient, hyperthyroidism was not treated on time, which in association with the adverse factor of acute urinary infection could have led to the development of thyrotoxic storm. When the possibility of thyrotoxic crisis was suspected on the basis of clinical presentation, we immediately initiated thyrostatic therapy, beta blockers and corticosteroids. Subsequently, when laboratory reports on elevated thyroid hormones became available, our decision proved right. The excessive rise of T3 hormone could be one of the pathogenetic mechanisms in the development of thyrotoxic crisis. On the other hand, our patient had an extreme increase of T4 (perhaps it was T4 hyperthyroidism), which is quite a common finding in elderly people. This speaks against the fact that some specific high level of T3 hormone is the discriminatory factor (responsible) for thyrotoxic storm. In the present case, thyrostatic therapy included propylthiouracil to decrease peripheral T4 conversion to T3 (in contrast to methimazole). This therapy led to clinical improvement already after 24 hours.

Considering verified pancytopenia (leukopenia), we planned to use radioiodine therapy as soon as possible as a definitive therapeutic option. That is why potassium iodide was not added in therapy, as a usual procedure in such cases.

Interestingly enough, leukopenia induced by the administration of thyrostatics did not worsen (as expected), however, leukocytes increased, which could be in part attributed to the effect of steroid therapy. Along with specific medication, all other medical care was prescribed, including rest, sedation, fluid replacement, electrolytes,

antibiotics and digitalis, that also contributed to keeping the disease symptoms down within a short lapse of time. Although the thyrotoxic crisis mortality rate has been considerably reduced by specific therapy and medical care, from 20%-30% to 7%, it is still quite high and these patients require treatment at intensive care units.

The most common cause of death is malignant ventricular arrhythmia. Our patient was hospitalized at Intensive Care Unit for the need of continuous monitoring to recognize the possible disturbances, i.e. worsening and conditions that require emergency intervention, on time.

Tachyarrhythmia and hyperpyrexia caused by total breakdown of thermoregulatory mechanisms were the leading clinical signs (our patient had both). She also showed extreme signs of tremor, prostration and dehydration as well as extreme weakness. The diagnosis is based on clinical picture and there is no need to wait for laboratory findings to confirm hyperthyroidism. Therapy should be initiated immediately, in other words as soon as possible, as every minute is precious. Besides this, it is importaint to recognize and notice other unfavorable factors that can worsen hyperthyroidism and lead to thyrotoxic storm, and to initiate treatment before the crisis is manifested.

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Sažetak

TIREOTOKSIČNA KRIZA U 75-GODIŠNJE BOLESNICE

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Žena u dobi od 75 godina primljena je u Jedinicu za intenzivno liječenje pod slikom tireotoksične krize. Iako se je već ranije sumnjalo na hipertireozu, tireosupresivna terapija nije započeta na vrijeme, što je uz negativne pridružene čimbenike (akutna mokraćna infekcija) doprinjelo nepovoljnom razvoju bolesti. Kombinirana terapija propiltiouracilom, propranololom, hidrokortizonom te kardiotonicima zbog brze atrijske fibrilacije u sklopu aterosklerotskog i tireotoksičnog srca, uza sedative i ostale potporne mjere dovela je do kliničkog poboljšanja već nakon 24 h. Ubrzo nakon normalizacije hormona štitnjače primijenjena je RJ terapija kao definitivno rješenje, čemu je doprinjela i pancitopenija dokazana još prije započete terapije tireostaticima. Ovim prikazom želi se ukazati na još uvijek moguću pojavu tireotoksične krize koja je danas zahvaljujući primjerenom liječenju hipertireoze izrazito rijetka, no uz neprepoznavanje bolesti i zakašnjelu terapiju te nepovoljne druge čimbenike (npr. akutni infekt) još se uvijek može sporadično susresti. Iako je smrtnost drastično smanjena, ipak je još uvijek dosta visoka i iznosi oko 7%, zbog čega i takvi bolesnici zahtijevaju smještaj u jedinice za intenzivno liječenje.

Ključne riječi: *Tiroidna kriza, dijagnostika; Tiroidna kriza, terapija; Hipertiroidizam, etiologija; Prikaz slučaja*