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Perioperative Management of Hyperthyroidism Patient undergoing Appendectomy

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Abstract: ***Background: Hyperthyroidism is a condition where the hormone levels of T4, T3 or both are high and result in various systemic symptoms. The worst complication in patients with hyperthyroidism is thyroid storm. Case: A 49-year-old female patient was diagnosed with atrial fibrillation and abdominal pain when she was admitted to emergency department of hospital with complaints of chest pain and palpitation. In ward patient also complain with fine tremor, abdominal pain, warm skin, firm, enlarged and palpable thyroid, and weight loss in 3 month, and later patient was diagnosed with hyperthyroidism from internist and appendicitis from surgeon, patient was scheduled for appendectomy. Aims: The aims of management in this case were to resolve the symptoms presented and get the thyroid hormone levels restored to euthyroid or subclinical hyperthyroidism state to prevent thyroid storm after the surgery. Results: PTU with high dose and propranolol were given after diagnosis for symptomatic reliever and rate control. After five days patient was going to appendectomy, and thyroid storm no occurs after the procedures. Conclusion: In patients with hyperthyroidism who will undergo emergency surgical procedures such as appendectomy, the levels of FT4 and TSHs should be close to euthyroid or subclinical hyperthyroidism to prevent thyroid storms.***

Keywords: Hyperthyroidism, Perioperative, Appendectomy, Antithyroid drugs

1. Introduction

Hyperthyroidism (or thyrotoxicosis) is caused by excessive amounts of thyroid hormones in the circulation. Hyperthyroidism resulting from disorders of the thyroid gland is called primary hyperthyroidism. Hyperthyroidism is a common condition, with a prevalence rate of about 2% in women and 0.2% in men in the general population.[1] The prevalence of hyperthyroidism varies with the degree of iodine sufficiency in the population under study. The National Health and Nutrition Examination Survey (NHANES III) data from the United States and a detailed epidemiologic survey in the United Kingdom demonstrate the female preponderance of thyroid patients and the lower prevalence of hyperthyroidism compared to hypothyroidism. Although relatively underpowered, these studies have indicated a prevalence of approximately 1% to 2% in women and about one tenth that frequency in men. Overall, in women the incidence was estimated to be 1 case per 1000 per year over a 20-year follow-up.[2]

Hyperthyroidism can be caused by Graves' disease, toxic nodular goitre, thyroiditis, drug induced hyperthyroidism, gestational, hydatidiform mole and choriocarcinoma. Symptoms and sign of hyperthyroidism: Tremor, palpitations, tiredness, heat intolerance, sweating, muscle weakness, loose bowel motions, anxiety, breathlessness, Weight loss, tremor, tachycardia, atrial fibrillation, systolic hypertension and wide pulse pressure, warm, clammy hands, proximal myopathy, prominent eyes, lid retraction and lid lag, thyroid bruit.[1] Thyroid storm is usually of abrupt onset and occurs in patients in whom pre-existing thyrotoxicosis has been treated incompletely or has not been treated at all. It's usually precipitated by infection, trauma, surgical emergencies, or operations and, less commonly, by radiation thyroiditis, diabetic ketoacidosis, toxemia of pregnancy, or parturition. The clinical picture of thyroid storm is fever, central nervous system effects: agitation, psychosis, seizures, until coma, gastrointestinal hepatic dysfunction: diarrhoea, nausea, and jaundice, cardiovascular problem: tachycardia, congestive heart failure and atrial fibrillation can occur. The mortality rate due to cardiac failure, arrhythmia, or hyperthermia is as high as 30%, even with treatment.[3] To diagnosis this using Burch - Warsofsky score.[2] Pre-treatment with anti- thyroid drugs is required to render the patient euthyroid prior to surgery.[4] Medication before surgery to prevent thyroid storm: Antithyroid drug (carbimazole, methimazole and PTU) and Beta blocker.

Table 1: Burch – Wartofsky scoring

Criteria	Score
Thermoregulatory Dysfunction	
Temperature 99°–99.9°F (37.2°–37.7°C)	5
Temperature 100°–100.9°F (37.8°–38.2°C)	10
Temperature 101°–101.9°F (38.3°–38.8°C)	15
Temperature 102°–102.9°F (38.9°–39.3°C)	20
Temperature 103°–103.9°F (39.4°–39.9°C)	25
Temperature ≥104°F (40°C) or higher	30
Central Nervous System Effects	
Absent	0
Mild agitation	10
Delirium, psychosis, lethargy	20
Seizure or coma	30
Gastrointestinal Dysfunction	
Absent	0
Diarrhea, nausea, vomiting, abdominal pain	10
Unexplained jaundice	20
Cardiovascular Dysfunction (beats/min)	
90–109	5
110–119	10
120–129	15
130–139	20
≥140	25
Congestive Heart Failure	
Absent	0
Mild (edema)	5
Moderate (bibasilar rales)	10
Severe (pulmonary edema)	15
Atrial Fibrillation	
Absent	0
Present	10
History of Precipitating Event	
Absent	0
Present	10

Based on the total score, the likelihood of the diagnosis of thyrotoxic storm is: unlikely, <25; impending, 25–44; highly likely, >45.

Source: Thyroid Emergencies (2012).

2. Case Illustration

A 49 years old female patient was admitted to the emergency department due to chest pain and palpitation. This was the second time she experienced the symptoms and she did not experience any temporary loss of consciousness. On physical examination, patient was compos mentis. Her blood pressure was 127/77 mmHg, heart rate 128 beat per minute irregular, body temperature 36,7°C, respiratory rate was 26 breaths per min. Chest and abdomen examination were normal. Her ECG report showed rapid ventricular response that indicates atrial fibrillation, patient was treated by cardiologist with: aspilet 75 mg once a day, clopidogrel 80 mg once a day, atorvastatin 20 mg once a day, ISDN 5 mg t.i.d and propranolol 20 mg b.i.d and admitted to High Care Unit Ward.

Laboratory result shown is haemoglobin value of 11.9 g/dL, hematocrit 37.2%, MCV: 80,5 fl, MCH: 25,8 pg, MCHC: 32,0 g / L, Thrombocyte 180,000 / uL, leukocytes: 6,500 / uL, glucose blood : 136, ,albumin serum : 2,9 g/dL, urea: 31 mg / dL, creatinine: 0.6 mg / dL, Prothrombin time : 11.9 sec, INR : 1.13, APTT : 40.9 sec. SGPT : 25 U/L, SGOT : 43, Natrium serum : 145 mmol/L, Potassium serum : 3.9 mmol/L, Chloride : 104 mmol/L, Troponin I : 0.05.

In HCU patient was consulted to internist because patient has experiencing intermitent palpitation, fine tremor, tachycardia, warm skin, and firm, enlarged and palpable thyroid. She has weight loss from 52 kg to 40 kg in three months. Patient also complaint about his pain on right lower abdomen. Patient was assessed with hyperthyroidism and observation abdominal pain. Propranolol with dose 20 mg twice a day was given to reduce patient's cardiovascular symptoms. PTU with 100 mg triple a day was given as an antithyroid drug to lower high thyroid hormone levels, diazepam 2 mg t.i.d, and planned to check TSHs and FT4, USG abdomen, and consulted with surgeon.

From laboratory thyroid function test : TSH <0.01 mIU/ml, Free T4 total is 26,6 ng/dL. USG Abdomen result was cholecystitis and multiple lymphadenopathy in McBurney e.c Suspect Appendicitis

From physical examination and USG abdomen patient was assessed with appendicitis acute and planned for appendectomy. Because the operation is urgent, patient is planned to be given lugol, but is not available, PTU 200 mg q.i.d was given and propranolol with dosage from cardiologist 20 mg b.i.d. Hydrocortisone or methylprednisolone was planned given before the surgery. Patient is planned for USG Thyroid examination. TSHs and FT4 test was planned in 5 days later to evaluate thyroid function.

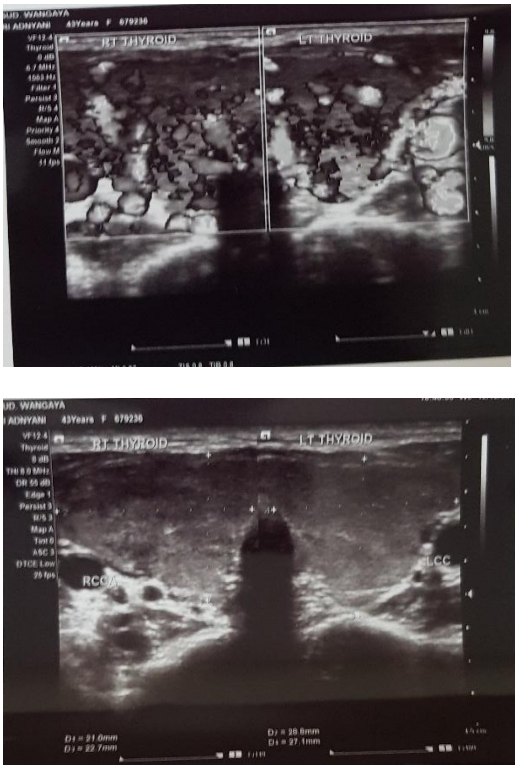

Figure 1: Result of USG thyroid

From USG Thyroid: Thyroiditis bilateral and nonspecific lymphadenopathy coli bilateral. With 5 days medication with antithyroid drug and beta blocker patient close to subclinical hyperthyroidism state (TSH <0.01mIU/ml, Free T4 total is 1,91 ng/dL) and patient going for appendectomy procedure. After appendectomy patient was admitted to High Care Unit Ward to observe any sign of thyroid storm. Patient was discharged with PTU 100 mg t.i.d and propranolol 20 mg b.i.d and get scheduled follow-up appointment to internist.

In follow up appointment patient was sent to a clinical pathologist for FNAB examination and the results show follicular hyperplasia with toxic sign.

3. Discussion

The patient was diagnosed with hyperthyroidism, this was assessed by the symptoms of hyperthyroidism in the form of palpitations, chest pain, weight loss despite increased appetite, frequent sweating, weakness and physical examination found weight loss, tremor, tachycardia, warm, clammy hands. Then the investigation was carried out and the ECG results were obtained: atrial fibrillation rapid response, in laboratory was found: increased FT4 and decreased TSHs. At this condition we calculate Wayne Index score is 36. In USG patients also found thyroiditis bilateral and appendicitis and planned to do an appendectomy.

Thyroid hormone like FT4 and T3 has effect in cardiovascular is positive ionotropic and chronotropic effects on the heart, the vasodilation and decrease in systemic vascular resistance and the consequent increase in sodium and water retention mediated by RAAS. Atrial fibrillation occurs in 10% to 15% of patients with overt

hyperthyroidism.[6] The greatest risk to the perioperative thyrotoxic patient is thyroid storm, which may cause cardiovascular collapse and death.[5,9]

The hyperthyroidism patient undergoing urgent or emergent surgery needs premedication with antithyroid agents, beta blocker, and possibly corticosteroid.

Since the patient was diagnosed with AF, she might have increased risk of getting stroke. Thyrotoxicosis can be the sole cause of AF and may predispose to AF-related compli-cations for instances stroke.The irregular fast heartbeat caused by AF increase risk of blood clot formation and travel to arteries of brain, block the blood circulation and leads to stroke. To prevent thrombus formation and increase risk of ischemic stroke, aspirin (antiplatelet) or warfarin (anticoagulant) remain the mainstays of the therapy. Before recommending medication for AF management, stroke risk in AF patient should be estimated through introduction of the CHA2DS2-VASc score as it can simplify the initial decision for oral anticoagulant use in AF patients.[10] In this case CHA2DS2-VASc score is 1 or in category moderate risk, then the patient is given aspilet and clopidogrel but it stopped because patient will be going for surgery procedure.

Antithyroid medications include thionamides, iodine, and iopanoic acid. This medicine is block thyroid hormone synthesis. Euthyroid can be achieved in 3 – 8 weeks with thionamides alone. Methimazole reverses hyperparathyroidism sooner than PTU.[6] Combination therapy can prepare a patient more rapidly for urgent surgery in 10 days or less. PTU has effect to reducing conversion of thyroxine to triiodothyronine, and its preferred in the first trimester of pregnancy because of its decrease teratogenicity.[6] PTU starting dose is usually 50 1-50 mg administered 3 times daily. Euthyroid is achieved after 6 weeks of treatment and for almost patients after three months[7] but in this case 5 days with high dose of PTU 200 mg quadruple a day can achieved close to subclinical hyperthyroid.

For emergency surgery with patient hyperthyroidism, cardiac status must be closely monitored. Perioperative placement of an arterial line or CVP monitor if patient has cardiopulmonary disease. Beta blocker are most commonly used in this condition.[6] Beta blockers leads to a decrease in heart rate, systolic blood pressure, muscle weakness, and tremor, as well as improvement in the degree of irritability, emotional lability, and exercise intolerance.[11] Propranolol also inhibit the monodeiodinase type 1 enzyme which converts t4 to the more biologically active T3 hormone. It can be used IV to control pulse, blood pressure and fever intraoperatively.[6,7] but with a shorter half-life the multiple dosage was suggested at dosage 10 - 40 mg 3 - 4 times. In this case patient was given with 40 mg twice a day before operation was sufficient.

Corticosteroid may be used if adrenal sign is low and hydrocortisone was given with dose 100 mg every 8 hours.[5], Glucocorticoid decrease the conversion of thyroxine of triiodothyronine within a matter of hours, so they may be added preoperatively and tapered over 3 days postoperatively. Suggested dose hydrocortisone 100mg orally or IV every 8 hours, dexamethasone 2 mg orally or IV every 6 hours, or betamethasone 0,5 mg orally, IM or IV every 6 hours[6] in this case corticosteroid is not given because no sign of adrenal level.

In order to stabilize the thyrotoxicosis rapidly inorganic iodide should be given as an adjunct to thionamides because its administration blocks the organification of iodine, decrease the synthesis of thyroid hormones by the gland.[6]

Thyroid storm sign must be aware if any patient who develop fever, tachycardia, and confusion in the postoperative period. Burch devised a point system based on cardiac, neuropsychiatric and other physical findings to help with diagnosis.[5] After surgery patient was admitted to High Care Unit Ward for 2 days. Concomitant use of beta blockers and thionamides should adequately prepare most patients for surgery within a few weeks. These agents should be continued throughout the postoperative period to prevent thyroid storm and possibly longer. When patient go for outpatient, PTU was given with dose 100 mg three times a day and propranolol 20 mg twice a day.

4. Conclusion

In patients with hyperthyroidism who will undergo emergency surgical procedures such as appendectomy, the levels of FT4 and TSHs should be euthyroid or subclinical hyperthyroidism state to prevent thyroid storms. In this case the combination high dose of propylthiouracil 200 mg quad a day and propranolol 20 mg twice a day in 5 days is close enough to reach it.

5. Conflict of Interest

No conflict of interest is declared

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