

Calamity averted: A case report on postoperative thyroid storm

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Abstract

We report a case of 22yr/M admitted for knee arthroscopic procedure and medial Patello-femoral ligament repair. Post-operatively patient developed high grade fever, tachycardia, hypertension for which sepsis was suspected and relevant investigations done. Further clinical manifestations made us to think of other hyper metabolic states. Hence Thyroid function test was done which revealed thyrotoxicosis. A diagnosis of thyroid storm was made in our case according to Burch-Wartofsky score and Japanese thyroid association criteria. Patient was treated with antithyroid drugs, beta-blockers and steroids.

Timely recognition and aggressive management is needed to prevent high mortality and morbidity in such cases. Mortality is as high as 10-30% even with early recognition and aggressive management.

Keywords: Thyrotoxic crisis, postoperative thyroid storm, postoperative fever, hyperthyroidism

Introduction

Thyroid storm is an extreme manifestation of hyperthyroidism. It can occur in poorly treated hyperthyroidism or as an initial manifestation of undiagnosed hyperthyroidism, usually precipitated by poor drug compliance, infection, surgery or anaesthesia. Symptoms of thyrotoxicosis are caused by an excess of beta adrenergic activity which include fever, tachycardia, sweating, tremor, agitation, weight loss, arrhythmia, heart failure and can even lead to death[1]. Incidence of thyroid storm is more common 6–18 hrs post-operatively than in the intra-operative period[2]. Mortality is as high as 10-30% even with early recognition and aggressive management[3]. In our case we faced a challenge in diagnosis as there was no preoperative history or clinical features suggestive of hyperthyroidism.

Case Report

A 22 years male admitted with history of recurrent patellar dislocation with complete rupture of medial Patello-femoral ligament. Preoperative investigations and clinical examination were normal except for a squint, which was evaluated at 4 years of age. He was

taken up for diagnostic knee arthroscopy and repair of medial Patello-femoral ligament under spinal anaesthesia. Intraoperative period was uneventful. 4 Hours after surgery patient developed high grade fever (103o F), tachycardia (130/min), hypertension (180/100 mmhg) along with severe pain over surgical site for which he was treated with titrated IV opioids, NSAIDS, Antipyretics and other cooling measures. There was no blood loss or dehydration to account for tachycardia. He had high grade fever, tachycardia and severe pain over surgical site on first Post operative day too. Epidural analgesia was initiated and pain reduced significantly. But tachycardia (140-160/min) and fever spikes (103 F) persisted. Inflammatory markers with blood and wound cultures were done. Antibiotics escalated to carbapenems in view of high index of suspicion of sepsis as per our hospital antibiotic protocol.

On 2nd post-operative day patient had nausea, vomiting, altered sensorium (restlessness, disorientation). There were no clinical signs of meningism. CT brain was done, found to be normal. Patient had evolving clinical manifestations with increase

in severity and the persistence of the symptoms made us to think of other hyper metabolic states. A blood sample for thyroid function test was sent which revealed severe hyperthyroidism.

A diagnosis of thyroid storm was made according to the Burch- Wartofsky score 4. Our patient had a score of 80 which is highly suggestive of thyroid storm.

According to Japan thyroid association definition and diagnostic criteria for thyroid storm 5 our patient comes under TS1-definitive thyroid storm.

Endocrinologist opinion obtained, patient was started on T. carbimazole 20 mg BID, T. Propranolol 40 mg TID and IV dexamethasone 4 mg BID with adequate hydration. Patient showed gradual symptomatic improvement.

Follow up Thyroid function test revealed decrease in T3 and T4 levels. Patient was discharged on 10th Post-operative day with antithyroid medications.

After 15 days patient came for follow up, thyroid function test revealed decreasing trend of T3, T4 levels. Dosage adjusted to T. Carbimazole 20 mg TID after endocrinologist review.

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Figure 1: lateral view of neck showing absence of thyromegaly

LABORATORY REPORT			
18/05/004609	MRN : 107785	Collected On : 13/5	Reported On : 13/5
22 Years / Male	IP/OP No: IP/18000302	Room No: SURGICAL	Printed On : 13/5
Partial Report			
Test Description	Result / Units	Reference Range	
THYROID PROFILE			
FT3	17.08 pmol/L	4.0 - 8.3	
FT4	85.71 pmol/L	09- 20	
TSH	0.08 ug/dl	0.4 - 5.0	
End of Report			

Figure 2: Thyroid function test result

Criteria	Points
Thermoregulatory dysfunction	
Temperature (°C)	
37.2-37.7	5
37.8-38.3	10
38.4-38.8	15
38.9-39.4	20
39.4-39.9	25
≥ 40.0	30
Cardiovascular	
Tachycardia (beats per minute)	
100-109	5
110-119	10
120-129	15
13-139	20
≥ 140	25
Atrial fibrillation	
Absent	0
Present	10
Congestive heart failure	
Absent	0
Mild	5
Moderate	10
Severe	20
Gastrointestinal-hepatic dysfunction	
Manifestation	
Absent	0
Moderate (diarrhea, abdominal pain, nausea/vomiting)	10
Severe (jaundice)	15
Central nervous system disturbance	
Manifestation	
Absent	0
Mild (agitation)	10
Moderate (delirium, psychosis, extreme lethargy)	20
Severe (seizure, coma)	30
Precipitating event	
Status	
Absent	0
Present	10
Total score	
> 45	Thyroid storm
25-45	Impending storm
< 25	Storm unlikely

Figure 3: BURSCH-WARTOFSKY scoring system.

Discussion

Thyroid storm is a life threatening manifestation of hyperthyroidism due to excessive amount of circulating thyroid hormones. We report a case of 22 years old male who had Post-operative thyroid storm. In a recent manuscript thyroid storm is estimated to be 0.2 persons/ 1, 00,000 population / year, accounting for 0.22% of all thyrotoxic patients [6]. The diagnosis of thyroid storm is made clinically based on a constellation of signs and symptoms. Though Burch-Wartofsky score gives a likelihood that the patient has thyroid storm, it's not a definitive criteria. Our patient had Burch-Wartofsky score of 80 which indicates very high likelihood of thyroid storm. Akamizu et al reviewing the most common clinical presentations of thyroid storm in Japanese patients suggested that different combinations of symptoms that could categorize a patient as having definitive versus suspected storm. According to Japanese thyroid association criteria, our patient was labelled as TS [1]. In a survey of Japanese patients with thyroid storm, the leading cause of death include multiorgan failure (24%) and congestive heart failure (21%)[7]. The most common cause leading to thyroid storm were irregular

or discontinuation of treatment followed by infection [8]. Due to adherence of anti thyroid drugs and good pre op preparation of thyrotoxicosis patients there is a drastic decrease in surgical cause of thyroid storm. In our case the primary presentation was itself thyroid storm. Perioperative period made it further difficult to diagnose, as there are overlapping of symptoms of other conditions which occurs more commonly in the post operative period. The presence of CNS manifestations with fever, tachycardia along with thyrotoxicosis helped us in confirming our diagnosis of thyroid storm. According to Japanese thyroid association, treatment strategies involves control of systemic symptoms and signs, control of thyrotoxicosis, control of organ specific manifestations, identification and treatment of thyrotoxicosis. Pharmacological therapy involves antithyroid drugs, beta blockers, corticosteroids, inorganic iodide and antipyretic agents. Though propylthiouracil (PTU) was preferred drug earlier [9], there are no differences in mortality between patients treated with PTU and methimazole [10]. Inorganic iodide should be administered along with antithyroid drugs in patients with thyroid storm which reduces

blood flow to thyroid gland and blocks the release of thyroid hormones [11]. Hyperdynamic state and sympathomimetic symptoms related to excessive thyroid hormones should be treated with beta blockers. Beta 1 selective drugs such as landiolol, esmolol, bisoprolol are preferred than non-selective beta blockers for treatment of tachycardia. Propranolol without landiolol showed increased mortality in patients with congestive cardiac failure. Though not contraindicated use of non-selective beta blockers particularly Propranolol requires caution [12]. Glucocorticoids such as hydrocortisone or dexamethasone not only decrease peripheral conversion of T4 to T3, but also help prevent adrenal insufficiency due to severe thyrotoxicosis and improve vasomotor symptoms [13, 14]. Plasmapheresis can be used as a rescue treatment to remove thyroid hormones, catecholamine and cytokines if conventional medical treatments are ineffective or contraindicated [15].

Conclusion

Through very rare thyrotoxicosis can present as thyroid storm as an initial manifestation. Perioperative period being a highly stressful one, may act as a trigger for thyroid storm. Apart from sepsis, thyroid storm may also be considered as differential diagnosis, if associated with CNS and GI symptoms.

Prerequisite for diagnosis		
Presence of thyrotoxicosis with elevated levels of free triiodothyronine (FT3) or free thyroxine (FT4)		
Symptoms		
1.	Central nervous system (CNS) manifestations: Restlessness, delirium, mental aberration, psychosis, somnolence/lethargy, coma (≥ 1 on the Japan Coma Scale or ≥ 14 on the Glasgow Coma Scale)	
2.	Fever: ≥ 38°C	
3.	Tachycardia: ≥ 130 beats per minute or heart rate ≥ 130 in atrial fibrillation	
4.	Congestive heart failure (CHF): Pulmonary edema, moist rales over more than half of the lung field, cardiogenic shock, or Class IV by the New York Heart Association or ≥ Class III in the Killip classification	
5.	Gastrointestinal (GI)/hepatic manifestations: nausea, vomiting, diarrhea, or a total bilirubin level ≥ 3.0 mg/dL	
Diagnosis		
Grade of TS	Combinations of features	Requirements for diagnosis
TS1	First combination	Thyrotoxicosis and at least one CNS manifestation and fever, tachycardia, CHF, or GI/hepatic manifestations
TS1	Alternate combination	Thyrotoxicosis and at least three combinations of fever, tachycardia, CHF, or GI/hepatic manifestations
TS2	First combination	Thyrotoxicosis and a combination of two of the following: fever, tachycardia, CHF, or GI/hepatic manifestations
TS2	Alternate combination	Patients who met the diagnosis of TS1 except that serum FT3 or FT4 level are not available
Exclusion and provisions		
Cases are excluded if other underlying diseases clearly causing any of the following symptoms: fever (e.g., pneumonia and malignant hyperthermia), impaired consciousness (e.g., psychiatric disorders and cerebrovascular disease), heart failure (e.g., acute myocardial infarction), and liver disorders (e.g., viral hepatitis and acute liver failure). Therefore, it is difficult to determine whether the symptom is caused by TS or is simply a manifestation of an underlying disease; the symptoms should be regarded as being due to a TS that is caused by these precipitating factors. Clinical judgment in this matter is required.		
TS1, "Definite" TS; TS2, "Suspected" TS.		

Figure 4: Japanese thyroid association criteria

THYROID PROFILE			
TEST NAME	RESULT	UNITS	
T3	1.25	ng/ml	
T4	13.7	µg/dl	
TSH	0.01	µU/ml	
FT3	3.91	pg/ml	
FT4	1.15	ng/dl	
ANTI-TPO (a-TPO)	68.3	IU/ml	
AL RANGE :			
T3	: 0.80 - 1.80		
T4	: 5.0 - 12.5		
TSH	: 0.34 - 5.2		
FT3	: 2.5 - 3.9		
FT4	: 0.60 - 1.10		
ANTI-TPO (a-TPO)	: < 9.0		

Figure 5: Repeat thyroid function test result

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