Section: General Medicine

Case Report

THYROID STORM PRESENTING AS A RARE COMPLICATION OF THYROTOXICOSIS: CASE REPORT

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ABSTRACT

Thyroid storm is a rare but life-threatening endocrine emergency, often triggered by systemic infections. Fournier's gangrene, a rapidly progressive necrotizing fasciitis of the perineum, has a high mortality rate, particularly in uncontrolled diabetes mellitus. The coexistence of thyroid storm with Fournier's gangrene is exceptionally rare and poses significant diagnostic and therapeutic challenges. A case is presented of a 53-year-old male with uncontrolled type 2 diabetes mellitus (HbA1c 9.5%) who was admitted with high-grade fever (102°F), altered sensorium, and atrial fibrillation with rapid ventricular response (150 bpm), intubated for respiratory failure and admitted to the ICU. Laboratory investigations revealed severe thyrotoxicosis (TSH 0.21 µIU/mL, FT4 2.73 ng/dL, FT3 6.34 pg/mL), hyperglycemia, and markedly elevated procalcitonin (13.6 ng/mL), indicating severe bacterial sepsis. Local examination demonstrated extensive necrotic perineal lesions, and Fournier's gangrene was confirmed, prompting urgent surgical debridement. Based on a Burch-Wartofsky Point Scale score of 100, a diagnosis of thyroid storm was established.

The patient underwent prompt multidisciplinary management with antithyroid agents, beta-blockers, corticosteroids, insulin infusion, and broad-spectrum antibiotics, with procalcitonin levels guiding risk assessment and antimicrobial adjustments. This case emphasizes the need for vigilance for endocrine emergencies in critically ill patients, as the coexistence of thyroid storm, Fournier's gangrene, and uncontrolled diabetes markedly elevates morbidity and mortality. Early recognition, biomarker-driven evaluation, and timely surgical and medical intervention are essential to improve outcomes in such complex presentations.

Keywords: Thyroid Storm, Thyrotoxicosis.

INTRODUCTION

Thyroid storm represents one of the most severe manifestations of thyrotoxicosis, which is considered a medical emergency with high fatality rates despite modern medicine. It can present itself as severe hyperthermia, arrhythmias, central nervous system disturbances, liver failure, cardiovascular issues, or central nervous system breakdown.[1] Mortality rates vary from 8 to 25% despite proper treatment.[2] Precipitating factors commonly include systemic infections, surgery, trauma, and poor compliance with antithyroid medications. Recognizing thyroid storm is often complicated by the overlapping presentation with sepsis and other hypermetabolic states. Given overlapping signs with sepsis, it may be overlooked or misdiagnosed entirely. Co-occurrence with Fournier's gangrene has been scarcely documented, but in clinical terms, it erects a perilous double jeopardy. Accelerated metabolic demands, cardiovascular stress, and deranged immunologic responses converge, escalating the urgency of coordinated surgical, endocrine, and critical care.

Fournier's gangrene is a rapidly advancing, fulminant form of necrotizing fasciitis that affects the perineum, genitalia, and perianal regions. First described by the French venereologist Jean Alfred Fournier in 1883 as an idiopathic gangrene in otherwise healthy young men, the condition is now understood to be a

polymicrobial infection that can affect individuals across all genders and age groups. Despite remarkable strides in surgical techniques, intensive care, and antimicrobial therapy, mortality stubbornly remains elevated, ranging from 20% to 40% in tertiary settings, and as high as 45% in some.[3] Population-based studies suggest a lower mortality (around 7.5%), likely reflecting detection of milder cases or differences in case mix.[4]

The incidence of Fournier's gangrene is relatively rare, estimated at 1.6 cases per 100,000 males annually, peaking in those aged 50–79 years. Hospital experience remains scant; most institutions treat fewer than five cases annually. Such rarity often delays recognition, contributing to the spread before radical intervention.[5]

Diabetes mellitus emerges as the dominant risk factor, elevating vulnerability through immune dysfunction, microvascular compromise, and reducing healing capacity. Mortality also disproportionately rises with age, delayed presentation, septic shock, renal failure, and extensive tissue involvement.[6,7]

Baseline PCT is normally produced in negligible amounts by thyroid C-cells; however, its levels rise markedly in response to bacterial endotoxins and systemic inflammation. Its early rise and proportional relationship with infection severity lend both diagnostic and prognostic value, helping differentiate bacterial sepsis from non-infectious conditions.[8]

Moreover, benchmark cutoff values provide critical clinical guidance: procalcitonin (PCT) levels above 2 ng/mL reliably indicate sepsis, with a sensitivity of approximately 86% and specificity around 95%. Values of 0.5 ng/mL identify most septic cases but with reduced specificity. In surgical septic shock patients, PCT levels exceeding 9.7 ng/mL offer significant prognostic discrimination, achieving a sensitivity of 91.7% and specificity of 74.2%.[9]

This case report thus explores a rare triad: Thyroid storm in the backdrop of uncontrolled diabetic status and concurrent Fournier's gangrene, using PCT levels to frame prognostic insight. It illuminates the intricate pathophysiology, underscores the expanded burden of disease, and asserts the indispensable value of early biomarker-based risk stratification.

Case Presentation

This case report describes the clinical presentation of an 53-year-old male presented in emergency in altered sensorium, high grade fever. Patient had fever at presentation (102 F) and tachycardia (heart rate 150/min), ECG showed Atrial fibrillation. Inj Amiodarone 150 bol;us was given followed by infusion which reverted back to sinus rhythm. NCCT head done to rulr out any intracranial bleed. Patient got intubated in view of low GCS and respiratory failure and shifted to ICU for further management. Meanwhile, thyroid function result showed Hyperthyroidism (TSH-0.21, FT4- 2.73, FT3- 6.34), patient random blood sugar values are raised for which further work up was done and results showed uncontrolled type 2 diabetes mellitus (HbA1c – 9.5). Local examination of the genital and perineal region revealed erythema, edema, tenderness, and areas of blackish necrosis for which surgery opinion was taken and finding consistent with Fournier's gangrene. Meanwhile, serum procalcitonin report revealed sepsis (S. Pct- 13.6 ng/ml) Hemodynamic parameters revealed unstable blood pressure, high grade fever, neurological assessment demonstrated confusion, and met the criteria for thyroid storm which is a rare presentation of Thyrotoxicosis secondary to sepsis and uncontrolled type 2 diabetes mellitus

Systemic Examination Observations

1. **General:** The patient presents with acute toxicity, was febrile on presentation, and demonstrated altered sensorium.
2. **Cardiac:** Cardiovascular examination revealed an irregular pulse accompanied by pronounced tachycardia, consistent with atrial fibrillation and rapid ventricular response.
3. **Respiratory:** The patient was tachypneic with reduced oxygen saturation levels, suggesting evolving respiratory compromise.
4. **Abdominal/Perineal:** Examination of the genital and perineal region revealed diffuse swelling, erythema, and necrotic patches, with crepitus palpable on deep palpation, indicating subcutaneous gas.
5. **Neurological:** The patient exhibited signs of disorientation and confusion, indicative of an altered mental status associated with systemic infection and thyroid storm.

Differential Diagnosis

Based on the clinical presentation, the differential diagnoses considered Thyroid storm as the primary suspicion, given the perineal necrosis and systemic toxicity. Severe sepsis with septic shock was likely in view of hemodynamic instability and elevated inflammatory markers. Thyroid storm was strongly supported by fever, tachyarrhythmia, and altered sensorium. In addition, uncontrolled type 2 diabetes mellitus with concurrent infection and Fournier gangrene was considered in the light of the patient's history.

Management / Intervention

In cases of Thyroid storm complicated by uncontrolled diabetes mellitus and Fournier's gangrene, it is imperative to implement prompt and aggressive management. Endocrine stabilization is achieved with antithyroid medications, beta-blockers, corticosteroids, and supportive therapies for thyroid storm. Glycemic control is maintained with intensive insulin therapy, and patients require comprehensive critical care support, including intravenous fluids, electrolyte correction, and close ICU monitoring. The cornerstone of treatment is urgent surgical debridement of necrotic perineal tissue to halt disease progression. Broad-spectrum intravenous antibiotics are initiated empirically to address Gram-negative, Gram-positive, and anaerobic organisms.

DISCUSSION

Thyroid storm is a critical condition that has a lot of room for research and development due to high fatality rate and overlapping symptoms. Severe bacterial sepsis remains one of the most common precipitating factor. The present study represents how thyroid storm can influence clinical symptoms even in the background of an evident surgical emergency of Fournier's gangrene.[10]

Procalcitonin (PCT) has been identified as a valuable biomarker in the assessment of sepsis and necrotizing soft tissue infections. Elevated PCT levels correlate with disease severity and mortality in Fournier's gangrene.[11] In this case, the markedly elevated PCT was consistent with severe systemic infection and septic physiology, underscoring its prognostic relevance.

Fournier's gangrene is a surging necrotizing infection that demands urgent recognition and rigorous management. Diabetes mellitus remains the most significant predisposing factor, implicated in up to 60% of cases.[12] In this context, uncontrolled diabetes substantially increases susceptibility and contributes to a poorer prognosis.[12]

In 1993, Burch and Wartofsky developed a scale comprising multiple clinical signs and symptoms to aid in diagnosing thyroid storm, as outlined in the Table. A score higher than 45 is suggestive of thyroid storm, a score of 25-44 indicates an impending storm, and a score below 25 is unlikely to be thyroid storm. In this case, the patient had a total BWPS score of 100, which was highly suggestive of thyroid storm.

The coexistence of thyroid storm with Fournier's gangrene is exceedingly rare but carries important clinical implications. Thyroid storm exacerbates metabolic stress, tachyarrhythmia, and systemic catabolism, worsening the prognosis of septic conditions. This highlights the need for maintaining a high index of suspicion for endocrine emergencies in septic patients presenting with hypermetabolic features.

The laboratory findings in our case provided crucial insights that complemented the clinical picture. While most of the patient's lab values, including WBC, hemoglobin, and liver function tests, were within normal limits and did not contribute to a BWPS score, the patient's HbA1c level of 9.5.0% was elevated. This finding aligns with the existing literature on Fournier's gangrene, which identifies diabetes mellitus as a significant predisposing factor. The high serum procalcitonin (PCT) of 13.6 ng/mL, indicative of severe bacterial sepsis, supports the notion that the patient's clinical state was not solely driven by a septic response, but rather by the rare and complex interplay of the hypermetabolic state of the thyroid storm with the surgical emergency. This dichotomy reinforces the importance of considering multiple clinical and endocrine factors in such complex presentations.

Table 1

Test	Lab Value	Reference Range
CBC		
Hemoglobin	13.2 gm/dl	13.0 - 17.0 g/dL
WBC	15.98 x10^3/uL	4.0 - 11.0 x10^3/uL
Platelet	140 x10^3/uL	150 - 450 x10^3/uL
Thyroid panel		
TSH	0.21 uIU/mL	0.4 – 4.20 uIU/mL
Free T3	1.2 ng/mL	2.77 – 5.27 pg/mL
Free T4	2.73 ng/dl	0.78 – 2.19 ng/dl
LFT		
Total Bilirubin	3.48 mg/dL	0.2 - 1.3 mg/dL
SGOT/AST	194 U/L	17-59 U/L
SGPT/ALT	78 U/L	0 - 50 U/L
Serum PCT	13.6 ng/mL	< 0.5 ng/mL
HbA1c	9.5%	< 5.6%

CONCLUSION

This case highlights the rare but critical intersection of Thyroid storm, Fournier's gangrene, and uncontrolled diabetes mellitus, a combination that significantly heightens morbidity and mortality risk. The BWPS score can be used to diagnose the possibility of thyroid strome. The scenario highlights the importance of early recognition and prompt, multidisciplinary intervention to prevent severe outcomes. While prompt surgical debridement and broad-spectrum antimicrobial therapy are essential for stabilizing endocrine crises, such as thyroid storm, it is equally vital. Elevated serum procalcitonin levels in this context served as a useful prognostic marker, reflecting the severity of systemic infection. Clinicians should maintain a high index of suspicion and employ a coordinated, comprehensive approach when faced with overlapping endocrine and infectious emergencies to optimize patient outcomes.

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