It's A Trap! Takotsubo Cardiomyopathy Induced by Grave's Disease

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Learning Objectives

- ❑ To efficiently diagnose life-threatening complications of thyrotoxicosis in order to initiate the appropriate treatment.
- ❑ To understand the underlying mechanism of takotsubo cardiomyopathy, identify risk factors, and know how to manage the disease with guideline directed medical therapies.

Case Information

HPI

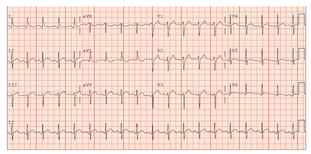
- A 61 year old female presenting with persistent substernal chest pain associated with nausea and vomiting. ***She also reported a 20lb weight loss over last 3 months, recent hair loss, palpitations, and fatigue.***
- She has a history of a provoked pulmonary embolism.
- She did not use any prescription medications.

Exam

- Heart rate of 137, blood pressure of 182/94, and hypoxia requiring 4L oxygen.
- Cardiac exam was notable for tachycardia with regular rhythm.

Pertinent Data

- Troponin of 6.0 ng/mL
- A ***TSH was undetectable*** (<0.01), with fT4 4.2 and total T3 254.
- Coronary angiogram revealed unobstructed, normal coronary arteries.



EKG demonstrated sinus tachycardia and ***1-2mm ST elevations in the anterior and the inferior leads***.

Hospital Course

- Following the coronary angiogram, she had worsening tachycardia and salvos of supraventricular tachycardia requiring intravenous adenosine.
- Echocardiogram revealed severe left ventricular dysfunction with an ***ejection fraction of 26.9% with severe hypokinesis of the mid- and apical segments.***
- Further workup revealed ***positive thyroid receptor antibodies***.
- She was diagnosed with ***stress cardiomyopathy secondary to thyroid storm from Grave's Disease.***
- She also developed paroxysmal atrial fibrillation (AF), which was rate controlled with esmolol
- She was treated with ***propylthiouracil, hydrocortisone, and Lugol's iodine solution*** and made a full recovery. She was discharged with ***anticoagulation and guideline directed medical therapy (GDMT)***.

Clinical Application

Thyroid Storm

- A rare but life-threatening complication of thryotoxicosis is a rare condition called thyroid storm (TS).
- Factors that increase the risk of TS are not well understood but several cases have documented that there is usually a precipitating insult (1).
- Along with the classic signs and symptoms of hyperthyroid disease, TS can present with hemodynamic comprimise, altered mentation, and fever (1,3).
- Cardiovascular dysfunction manifests with arrhythmias, such as Afib and high output cardiac failure.
- After intial stabalization, treatment should focus on preventing further manifestations of thyroid disease.
- This usually includes targeted therapies with beta-blockade, iodine solutions, anti-thyroid drugs (methimazole, propylthyouracil), and glucocorticoids (4).

Stress Cardiomyopathy

- Stress cardiomyopathy, also known as Takotsubo cardiomyopathy (TCM) is a non-ischemic cardiomyopathy that results in left ventricular systolic dysfunction.
- There are four diagnostic criteria described by the Mayo Clinic,which include imaging characteristics, EKG changes, and the exclusion of coronary artery disease (CAD) (2).
- Chest pain and dyspnea are among the most common presenting symtpoms.
- The disease has a favorable prognosis and is managed by treating the underlying heart failure with GDMT and anticoagulation (2).

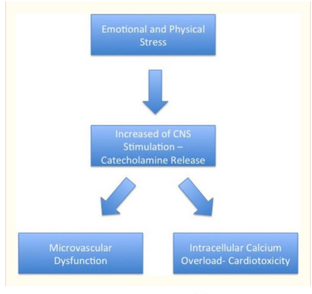
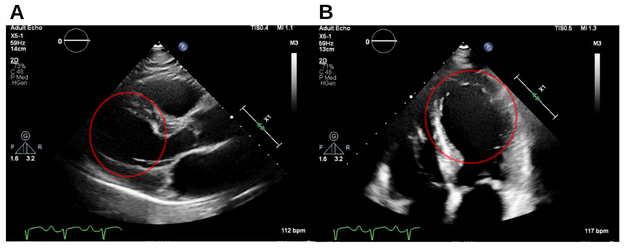


Figure 1. (2)

Imaging



Four chamber apical still (A) and parasternal long axis still (B) of the patient's transthoracic echocardiogram. Note the classic apical ballooning as outlined by the red circles.

Implications / Discussion

- TS is a rare but potentially lethal complication of untreated thryoid disease and requires hemodynamic stabalization with prompt reduction of thryoid hormone levels.
- The proposed pathologic mechanism of TCM is mediated through catecholamine induced toxicty.
- This patient likely developed TCM from a thyroid hormone induced massive cathecholamine discharge, which was further exacerbated by her tachyarrhythmia as a direct result of TS.
- Our treatment approach focused on managing her underlying thyroid disease while also initiating therapies for heart failure.

References

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