

Takotsubo cardiomyopathy associated with hyperthyroidism treated with thyroidectomy

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Takotsubo cardiomyopathy is an uncommon clinical entity, also called apical ballooning syndrome, characterized by transient systolic dysfunction of the apical and/or mid segments of the left ventricle. We report a case that highlights takotsubo syndrome in the setting of thyrotoxicosis that required thyroidectomy. The association of takotsubo syndrome and hyperthyroidism has been reported before. We found 13 previously reported cases of thyrotoxicosis-induced cardiomyopathy, most associated with Grave's disease and none treated with thyroidectomy. Awareness of this possible association is important in establishing the diagnosis and instituting proper management.

Takotsubo cardiomyopathy is characterized by transient left ventricular dysfunction with chest symptoms, elevated cardiac enzymes, and electrocardiographic changes such as ST-segment elevation and/or T-wave inversion without any coronary artery occlusion (1). The exact mechanism of the wall motion abnormalities is unknown, but it is believed to be related to hyperstimulation of endogenous catecholamines inducing myocardial dysfunction and stunning. Thyrotoxicosis is a rare cause of takotsubo cardiomyopathy related to its direct and indirect effects on the heart.

CASE PRESENTATION

A 61-year-old woman presented with dyspnea and palpitations. She denied chest pain or recent emotional stress. Examination disclosed tremors and mild respiratory distress, a blood pressure of 128/76 mm Hg, a heart rate of 126 beat per minute, and a respiratory rate of 24 breaths per minute. The electrocardiogram showed atrial fibrillation with rapid ventricular response and nonspecific ST-T wave changes (*Figure 1*). Her troponin T level was 0.12 ng/mL and creatine kinase MB, 6 ng/mL. A thyroid function test suggested the presence of thyrotoxicosis, with free T3 of 12.8 pg/mL (reference range, 2.30–4.20 pg/mL), free T4 of 5.64 ng/dL (reference range, 0.93–1.70 ng/dL), and thyroid-stimulating hormone of 0.01 uIU/mL (reference range, 0.27–4.2 uIU/mL). An echocardiogram showed moderately decreased left ventricular systolic function with an ejection fraction of 35% to 39% and akinesis of the septal wall and apical region. A coronary angiogram did not show any coronary artery stenosis,

but ventriculography showed large apical ballooning (*Figure 2*). A thyroid ultrasound showed a complex 5 mm nodule in the midinferior pole of the left thyroid gland. Thyroid-stimulating immunoglobulin was highly positive, indicating autoimmune hyperthyroidism (Grave's disease).

The patient's heart rate was controlled by a calcium channel blocker drip, and then the patient was started on beta-blockers, methimazole, and prednisone to treat thyrotoxicosis. Due to difficulty controlling her hyperthyroid state, a thyroidectomy was performed. Five days after the operation, the patient's clinical condition improved significantly, and she was sent home on beta-blockers and levothyroxine supplement. At 3 months of follow-up, the patient remained asymptomatic, and a repeat echocardiogram showed an ejection fraction of about 60% with no abnormal regional wall motion abnormalities.

DISCUSSION

Takotsubo cardiomyopathy, also known as stress-induced cardiomyopathy, consists of acute reversible nonischemic cardiomyopathy characterized by the hallmark of apical ballooning that leads to transient left ventricular dysfunction. Left ventricular function usually recovers in 1 to 4 weeks in patients who survive the acute episode. It has a presentation that mimics myocardial infarction with both electrocardiographic changes (ST-segment elevation and/or T-wave inversion) and elevated cardiac enzymes but with no coronary obstruction. In the vast majority of patients, coronary catheterization doesn't show evidence of significant coronary artery disease (2).

It is estimated that 2% of patients with suspected acute ST-elevation myocardial infarction have the syndrome (1). This condition can be easily mistaken for ST-segment elevation myocardial infarction. This in turn can lead to a misdiagnosis and hence wrong treatment, especially in a noncardiac center where thrombolysis remains a first-line treatment for acute ST-segment myocardial infarction. The other common presentation

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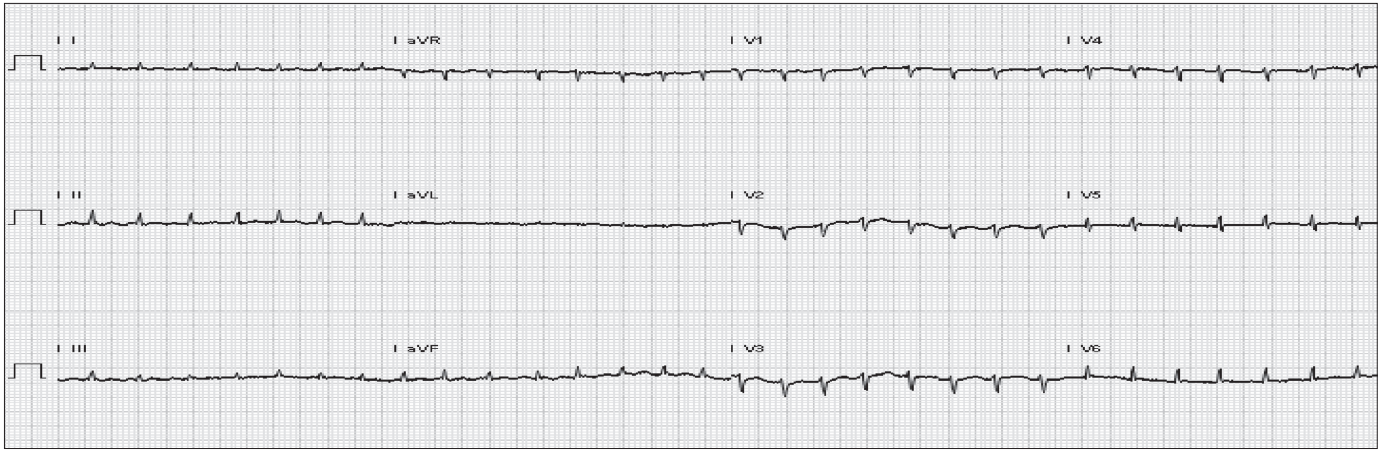


Figure 1. Electrocardiogram showing atrial fibrillation with rapid ventricular response and nonspecific ST-T wave changes.

is congestive cardiac failure, which is fortunately less of an issue, as it has a similar standard treatment (3).

We identified 13 previously reported cases diagnosed as takotsubo cardiomyopathy associated with thyrotoxicosis, most of which were associated with Grave's disease. Other causes included exogenous levothyroxine intake, Hashimoto's thyroiditis, and toxic multinodular goiter. In all cases, the patients had a complete recovery of the cardiomyopathy after treatment for thyrotoxicosis. Our case was unique as it did not respond well to medical management and our patient underwent thyroidectomy with complete resolution of her symptoms.

It has been noted that acute medical illness, physical stress, or emotional stress can be the trigger of takotsubo cardiomy-

opathy. Further, this condition is more common in elderly and postmenopausal women, which suggests that low estrogen levels or a sex-related difference in myocardial sensitivity to catecholamines might play a role in this condition (4, 5). It has even been suggested that takotsubo cardiomyopathy might be related to the autoimmunity of thyroid disease (6). The precise etiology, however, remains unknown. Inflammation and fibrosis have also been suggested as playing a role. A recent study suggested a significant contribution of oxidative stress to the pathogenesis of takotsubo syndrome, which further supports the idea of regional hypokinesis of the myocardium as a sign of inflammation related to stress (7).

Treatment of takotsubo cardiomyopathy is usually supportive, with standard medications for heart failure and treatment of the underlying conditions. Our patient was treated with a beta-blocker, antithyroid medications, and steroids, but due to persistent symptoms, she underwent a thyroidectomy.

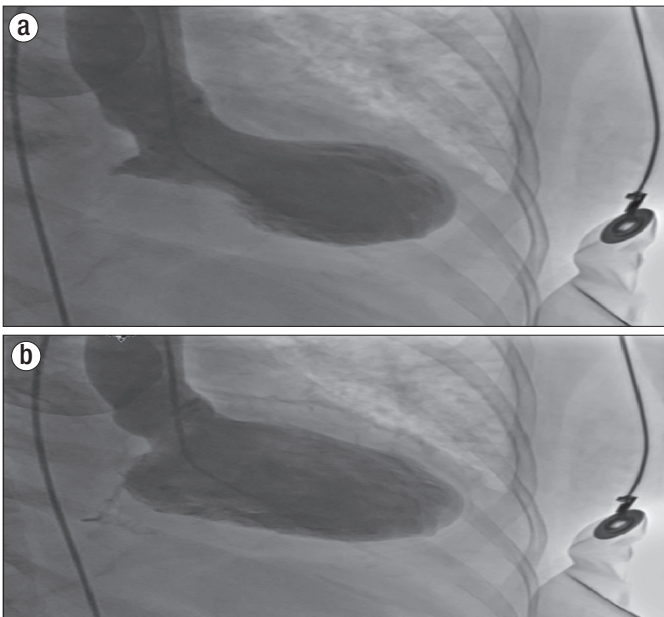


Figure 2. Left ventriculography showing apical ballooning during (a) systole and (b) diastole.

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