CLINICAL MEDICINE

Image Diagnosis: Takotsubo Cardiomyopathy Mimicking an Acute ST Elevation Myocardial Infarction in the Setting of Anti-Depressant Therapy Withdrawal

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E-pub: 04/03/2020

CASE PRESENTATION

A 77-year-old woman with a history of bipolar disorder, hypertension, hyperlipidemia, and previous tobacco use presented to the Emergency Department (ED) with acute shortness of breath and diaphoresis. The patient was initially anxious and tearful upon presentation to the ED. While she denied acute emotional or social stressors, she did note abruptly stopping her venlafaxine (brand name Effexor) approximately 3 weeks before. Results of an initial electrocardiogram (ECG) showed an ectopic atrial rhythm with marked diffuse ST-segment elevation most prominent in the anterolateral leads (Figure 1). Results of bedside echocardiography demonstrated a large territory of hypokinesis involving all apical segments with hypercontractile basal segments (Figure 2). Emergent invasive coronary angiography was performed, which demonstrated no obstructive coronary artery disease. Initial troponin I level was 1.26 ng/mL (normal < 0.04 ng/mL). Results of a subsequent ECG obtained at 4-week follow-up illustrated resolution of previously seen ST elevations, now with anterolateral T-wave inversions (Figure 3). Results of repeat echocardiography at 4-week follow-up demonstrated normalization of left ventricular systolic function and no segmental wall-motion abnormalities.

DISCUSSION

Takotsubo cardiomyopathy (TCM), also known as stress-induced cardiomyopathy or broken-heart syndrome, is an increasingly recognized cardiac diagnosis, characterized by transient left ventricular systolic dysfunction in the setting of an emotional or physical stressor and diagnosed more commonly in postmenopausal women. TCM is thought to occur in approximately 1% to 2% of patients undergoing invasive coronary angiography for a suspected acute coronary syndrome.¹-³ The precise pathophysiology of TCM remains unclear, but current evidence suggests stimulation of the sympathetic nervous system, resulting in increased levels of circulating and myocardial catecholamines. This in turn causes direct myocardial toxicity and microvascular dysfunction or spasm, thereby leading to myocardial ischemia.¹ Clinically, TCM requires the exclusion of obstructive epicardial coronary artery disease, typically by invasive coronary angiography. However, it may be difficult to distinguish TCM from a traditional myocardial infarction caused by thrombotic arterial occlusion with recanalization or transient epicardial coronary artery disease spasm. Indeed, these pathophysiologic phenomena may be part of the same clinical spectrum. In cases where TCM is not labeled as a clinical diagnosis, it is likely that it is also masked into the broad category of MINOCA (myocardial infarction with no obstructive coronary artery disease).

ECG findings in an acute ST elevation myocardial infarction (STEMI) may overlap with ECG findings in TCM, as was seen in this case. Typical ECG changes include ST-segment depressions; ST-segment elevations, more likely in the precordial leads and without reciprocal changes; T-wave inversions; and QT-interval prolongation. A ratio of ST elevation in leads V₄-V₆ to those in leads V₁-V₃ greater than or equal to 1 showed a specificity of 80%, a sensitivity of 77%, and an accuracy of 76% for diagnosis of TCM, as compared with a STEMI.⁴ The

Figure 1. Initial 12-lead electrocardiogram demonstrating an ectopic atrial rhythm and near diffuse marked ST elevations.

Figure 2. Apical 4-chamber view echocardiogram from same patient demonstrating classic apical takotsubo cardiomyopathy apical wall-motion abnormality at (A) end-diastole and (B) end-systole.

Figure 3. Follow-up echocardiogram at 4-week follow-up demonstrating normalization of left ventricular systolic function and no segmental wall-motion abnormalities.
combined ratio of ST elevation in the aforementioned leads and the absence of reciprocal changes had a sensitivity of 100% and an overall accuracy of 91% in the diagnosis of TCM, as compared with STEMI. In addition, the time course of ECG changes in TCM compared to that seen in an acute STEMI varies, with deeper T-wave inversions at 3 days or later often noted in TCM.

Echocardiography may aid in the diagnosis of a classic TCM pattern of apical ballooning with hypercontractile basal left ventricular contraction, but can be difficult to distinguish from a left anterior descending territory infarction. Midventricular and basal hypokinesis or focal wall-motion abnormality types have also been described, making a definitive diagnosis of TCM by echocardiogram, in isolation, limited.

Most cases of TCM have a favorable prognosis, with resolution of left ventricular dysfunction in 1 to 4 weeks with concomitant medical therapy for systolic heart failure with beta blockers and angiotensin-converting enzyme inhibitors/angiotensin receptor-blocking agents. This medical regimen is associated with a reduced recurrence rate of TCM, although evidence is limited. Treatment of comorbid illnesses and addressing emotional stressors are hypothesized to be key to recovery. Data from the International Takotsubo Registry identify the presence of an acute neurologic or psychiatric illness, a physical versus an emotional trigger, high troponin levels, and an overall accuracy of 91% in the diagnosis of TCM, as compared with STEMI.

Classically, the diagnosis of TCM can be made with diagnostic cardiac imaging, in the setting of a clear precipitating emotional, physical, or social stressor. While this case could have been precipitated by decapsulation of the patient's mood disorder, it additionally raises the question of a potential correlation between biochemical withdrawal from antidepressant therapy and TCM. As catecholamine excess is the dominant mechanism underlying TCM, drug-induced catecholamine excess with antidepressant and anti-psychotic medications could provide a similar mechanistic basis. In this case, the patient was on a serotonin-norepinephrine reuptake inhibitor (SNRI), a medication that increases the levels of serotonin and norepinephrine in the brain, and she had abruptly discontinued the medication. The correlation between TCM and SNRI therapeutic use or overdose has been suggested previously in a case series of 6 patients. Certainly, SNRI withdrawal and/or the uncontrolled mood disorder itself are plausible explanations for this patient’s cardiac event. Patients with depression tend to exhibit unusually high levels of norepinephrine in response to an emotional stressor. We recommend that comprehensive chart review and history-taking relevant to mood disorders, as well as psychotrophic medication use and/or discontinuation, should be a routine part in the evaluation of a patient with suspected TCM.

Disclosure Statement
The author(s) have no conflicts of interest to disclose.

How to Cite this Article

References

Image 3. Repeat 12-lead electrocardiogram from same patient obtained approximately 4 weeks later demonstrating resolution of previously seen ST elevations, and anterolateral T-wave inversions