



Broken Heart Syndrome: A Case Report

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Abstract

Stress-induced cardiomyopathy or Takotsubo cardiomyopathy is a recently increasing diagnosed disease manifested by transient apical or mid left ventricular dilation and dysfunction. This sign is similar to acute myocardial infarction but without significant coronary artery stenosis. There are important and essential differences between Takotsubo cardiomyopathy and acute myocardial infarction in terms of management, necessitating a good understanding of the pathophysiology, diagnosis, and treatment of the former.

We report a case of Takotsubo cardiomyopathy which presented with dizziness and near syncope after an intense emotional stress. Electrocardiogram showed ST-T changes in V1-V3 and echocardiography revealed severe left ventricular systolic dysfunction with marked regional wall motion abnormalities. Coronary angiography demonstrated minimal coronary artery disease.

The patient was treated with beta-blockers, angiotensin-converting enzyme inhibitors, Aspirin, Clopidogrel, and diuretics. At the follow-up visit, all the symptoms had disappeared and control echocardiography showed significant improvement in the left ventricular systolic function with a normal ejection fraction and normal wall motion.

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Introduction

Takotsubo cardiomyopathy (TCM), also known as stress-induced cardiomyopathy, apical ballooning syndrome, and broken heart syndrome,¹ is an uncommon, recently recognized cardiac syndrome characterized by an abrupt onset of severe chest discomfort which mimics acute myocardial infarction (MI) in both clinical and electrocardiographic findings.²

TCM was initially described in Japan³ and subsequently reported in the USA⁴ and Europe.⁵ The word "Takotsubo" is a Japanese name for a narrow-necked octopus trap, which resembles the apical ballooning configuration of the left

ventricle in systole as seen on ventriculography.⁶

The pathophysiology of TCM is the transient systolic dysfunction of the apical and/or mid segment of the left ventricle without any significant obstructive coronary artery disease.² TCM predominantly occurs in elderly postmenopausal women.⁷ In a review of ten case series, 80-100% of the TCM cases were women with a mean age of 61-76 years.¹ The prevalence of stress-induced cardiomyopathy is about 1.7% to 2.2% of cases presenting with acute coronary syndrome symptoms.⁸

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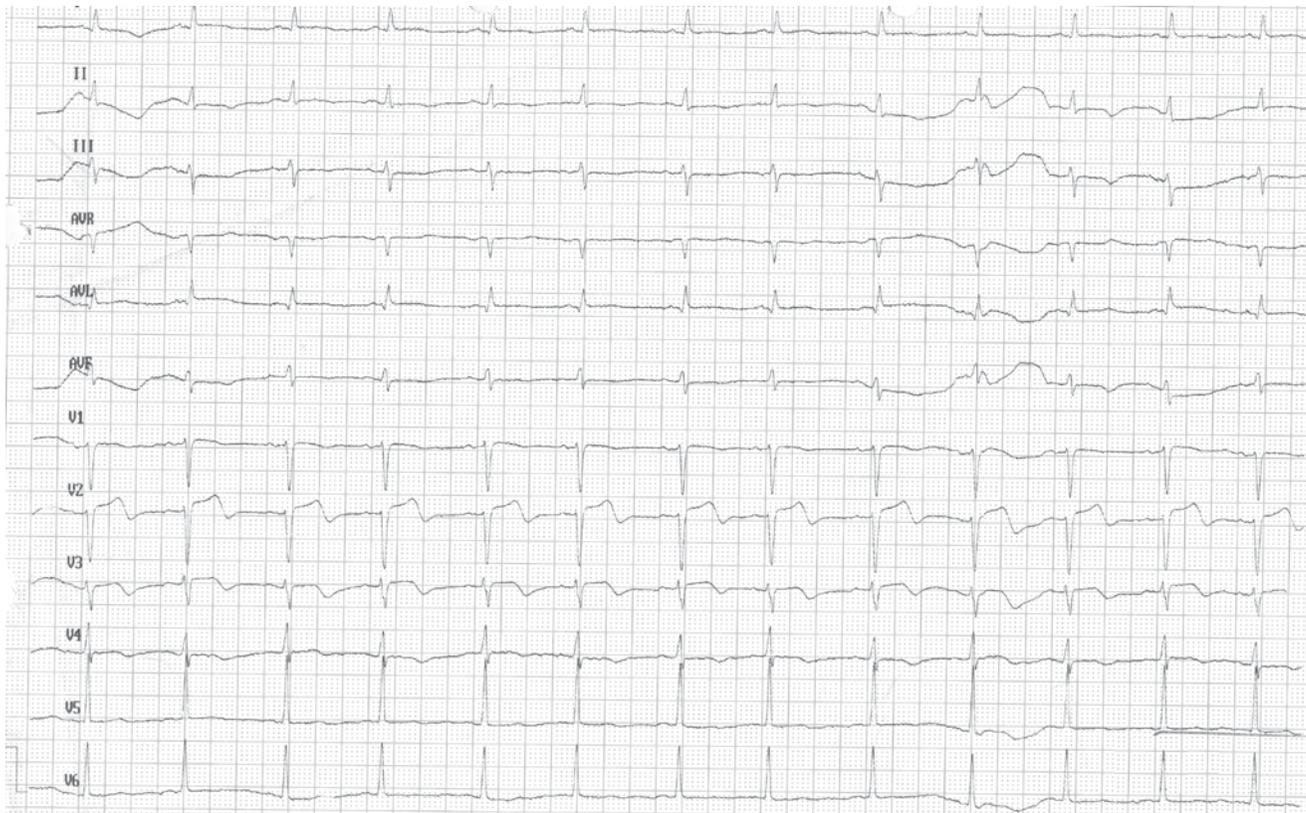


Figure 1. Electrodiagram of the patient

Case Report

A 69-year-old woman with a past history of hypertension was referred to our emergency department with complaints of dizziness and malaise and a transient pre-syncope attack following an intense emotional stress due to witnessing her sister's death. She did not mention any chest discomfort, retrosternal pain, and dyspnea. She had been taking Aspirin and Valsartan at home. On arrival, her vital signs were stable. A twelve-lead standard electrocardiogram (ECG) showed normal sinus rhythm with slight ST-segment elevation in V1-V3 (about 1 mm) and biphasic T wave changes in V1-V4 (Figure 1). Routine laboratory tests, including complete blood cells, lipid profile, electrolytes, and liver function tests were all within normal limits except a marked elevation in cardiac enzymes (with a peak level of high sensitive cardiac Troponin T and CK-MB mass within 24 hours after the onset of symptoms, which showed hscTnT 1579 ng/L [reference range < 14 ng/L] and CK-MB mass 35.88 ng/L [reference range for females < 3.77 ng/ml]).

Echocardiography results revealed severe left ventricular systolic dysfunction (ejection fraction about 30%) with marked regional wall motion abnormalities in the mid anterior, mid-septal, mid inferior, and apical segments of the left ventricle (Figure 2).



Figure 2. Echocardiography showing reduced left ventricular systolic function (ejection fraction about 30% by Simpson)

The patient was transferred to the catheterization laboratory, where coronary angiography demonstrated non-obstructive plaques at the mid part of the left anterior descending artery (LAD) and the proximal part of the left circumflex artery (LCX). These findings were consistent with minimal coronary artery disease. Left ventriculography revealed akinesia at the mid-inferior, mid-anteroseptal, and apical segments of the left ventricle. Left ventricular

injection showed severe systolic dysfunction. The patient was treated with beta blockers, angiotensin-converting enzyme inhibitors, Aspirin, Clopidogrel, and diuretics. She was discharged from hospital after five days without any complications during the hospital course.

She was recommended to be re-evaluated one month afterwards. At the follow-up visit, all the symptoms had disappeared and control echocardiography showed significant improvement in the left ventricular systolic function with a normal ejection fraction (about 60%) and normal wall motion. Table 1 depicts a comparison between both echocardiographic findings.

Table 1. Comparison between initial and follow-up echocardiographic measurements

	Initial echocardiography	Follow-up echocardiography (after one month)
LVD d (mm)	51	47
LVD s (mm)	43	32
RWMA	Yes	No
Diastolic Dysfunction Grade	2	1
Global EF (%)	30-35	60

LVD d, Left ventricular end diastolic diameter; LVD s, Left ventricular end systolic diameter; RWMA, Regional wall motion abnormality; EF, Ejection fraction

Discussion

Stress-induced cardiomyopathy is associated with physical or emotional stress. These stressors frequently include death of relatives, domestic abuse, arguments, catastrophic medical diagnoses, devastating financial or gambling losses, and natural disasters.⁹

TCM may be caused by catecholamine-induced microvascular spasm or dysfunction, giving rise to myocardial stunning.¹⁰ In a large cohort of 121 patients with TCM, a significant stressful event was identified in 89% of the patients immediately before TCM presentation.¹¹ In a case series, only 50% of the patients had an emotional stress before the diagnosis was confirmed.¹² In the case presented herein, the death of our patient's sister was the trigger for all her syndromes.

TCM occurs more commonly in women.⁷ In a study of 12 patients, all were female in the postmenopausal age,¹² as was our patient.

Stress-induced cardiomyopathy commonly presents like an acute MI. The most common presenting cardiovascular symptom of TCM is retrosternal chest pain. Other clinical presentations include dyspnea, syncope, shock, and arrhythmia.¹³ In a systematic review of 286 patients with TCM, electrocardiographic abnormalities, especially ST-segment elevation in the anterior precordial leads, were

the most common findings. Other reported abnormalities in the ECG are deep T wave inversion with QT interval prolongation and abnormal Q waves. In some cases, the ECG might be normal.¹⁰ In contrast to our case, cardiac biomarkers are often mildly elevated.¹⁰ Other syndromes associated with ST-segment changes and normal coronary angiography include cardiac syndrome X, Prinzmetal's angina, myocarditis, and cocaine abuse. Our patient did not have chest discomfort and presented with presyncope, slight ST-segment elevation in leads V1 to V3, and elevated cardiac enzymes.

In this case report, we presented a patient with severe left ventricular systolic dysfunction (ejection fraction = 30% in the first echocardiography), which was transient and resolved after one month (ejection fraction = 60% in the second echocardiography). This pattern resembles the course of stress-induced cardiomyopathy. Stimulation of catecholamine release caused by emotional or physical stress may result in transient left ventricular systolic dysfunction via an increase in intracellular calcium and oxygen-free radicals, epicardial microvascular spasm, or direct injury to myocytes.¹⁴ Other disorders with transient left ventricular systolic dysfunction such as toxin-induced cardiomyopathy or peripartum cardiomyopathy could not explain the condition of this patient.

In our patient, echocardiography revealed apical, mid-anterior, mid-septal, and mid-inferior akinesia with reduced left ventricular systolic function, which are the characteristic features of TCM.^{9, 10}

The diagnosis of TCM needs coronary angiography to exclude obstructive coronary artery disease. In our patient, coronary angiography showed minimal coronary artery obstruction.

In a large cohort study of 136 patients with TCM, only 3 deaths were reported and 126 patients ultimately had a normal ejection fraction ($\geq 50\%$).¹¹ The in-hospital mortality rate of stress-induced cardiomyopathy is 0 to 8%.^{1, 15} Long-term follow-up of TCM patients demonstrated that the survival of these patients was reduced compared to that in the general population.¹¹

Given the transient nature of stress-induced cardiomyopathy, this disorder can be managed with supportive therapy. It is reasonable to treat these patients with standard drugs for left ventricular systolic dysfunction such as beta blockers, angiotensin-converting enzyme (ACE) inhibitors, and diuretics as needed. When coronary atherosclerosis is evident, Aspirin is also recommended.^{5, 7} This treatment can be continued until the recovery of heart failure. As this syndrome may recur, a beta blocker alone or in combination with an alpha blocker can be continued indefinitely in the absence of contraindications.



Conclusion

TCM should be suspected in postmenopausal women who present with acute coronary artery syndrome symptoms after an intense emotional stress. Initially, these patients should be managed as acute coronary syndrome and follow-up echocardiography would yield diagnosis.

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