

Pheochromocytoma-Related Cardiomyopathy or Stress Cardiomyopathy Secondary to Pheochromocytoma: Is New Terminology Needed?

To the Editor:

Stress cardiomyopathy—apical ballooning, tako-tsubo syndrome, or transient apical dyskinesia—is an intriguing condition of unknown etiology. It typically affects older women who, after an event causing physical or emotional stress, present chest pain and ST elevation on the anterior aspect of the ECG (although it may also show T-wave inversion, depressed ST, or normal findings). At presentation, the condition may be confused with acute

ST-elevation myocardial infarction. These patients usually present normal coronary angiography, minimally elevated markers of myocardial injury, and transient ventricular dysfunction, which is usually apical, although occasionally in the basal or medial segments.¹⁻³

A 41-year-old woman with a history of untreated mild hypertension went to the emergency room of her hospital, presenting with anginal chest pain and ST segment elevation on the lateral aspect. For the previous 3 years, she had suffered an anxiety disorder that had required hospitalization on 1 occasion. In the few weeks immediately prior to the present condition, she had experienced significant stress at her job, and 4 days before admission had learned that a friend had a serious illness. On arrival to the emergency room, blood pressure was recorded at 110/70 mm Hg. Following sublingual nitroglycerin, the patient's clinical symptoms ceased, the ECG normalized, and she was admitted to the intensive care unit with a diagnosis of non-ST-segment-elevation acute coronary syndrome. At 12 hours, she again experienced pain with ST segment elevation and was transferred to our hospital for cardiac catheterization. The coronaries were angiographically normal, although ventriculography showed severe mid-ventricular dysfunction, with hypercontractility of the basal and apical segments. Three-dimensional echocardiography confirmed the contractility abnormality (Figure A and B). Beta-blockers and angiotensin-converting enzyme inhibitors were started, and anticoagulation and aspirin were maintained. The patient remained asymptomatic, with normal creatine kinase and troponin I of 1.4. At 5 days of hospitalization, cardiac MRI still showed mid-ventricular hypokinesia with no late gadolinium enhancement (Figure C). The patient progressed adequately. Transthoracic echocardiography on day 12 of hospitalization showed a left ventricle of normal size, with no regional contractility abnormality and with intact systolic function (Figure D). Based on the patient's course, she was diagnosed with stress cardiomyopathy or atypical tako-tsubo (due to the medial site of akinesia).

On admission to our hospital, blood and urine catecholamines were requested for better characterization of the symptoms. These showed higher-than-normal elevation (blood noradrenaline and adrenaline >5000 and 190 pg/mL; noradrenaline and metanephrine in urine at 24 h, 582, and 5386 µg/24 h). Abdominal computed tomography revealed a large mass in the right adrenal gland of 11.4×12.8 cm with multiple enlarged mesenteric, retroperitoneal, and iliac lymph nodes (both chains), establishing the presumptive diagnosis of pheochromocytoma. Two weeks later, the patient underwent right adrenalectomy and nephrectomy, and retroperitoneal lymphadenectomy. The histology confirmed pheochromocytoma and follicle center lymphoma in the lymph nodes. At present the patient is asymptomatic and is receiving chemotherapy for her lymphoma.

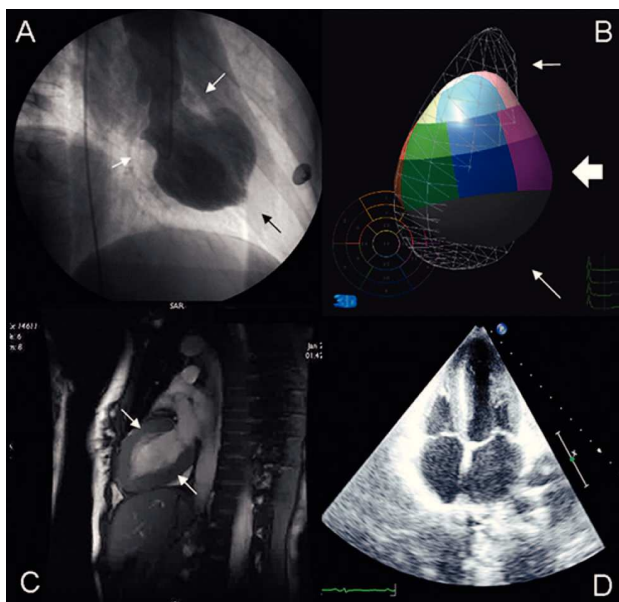


Figure. A: contrast ventriculography. B: three-dimensional echocardiography. C: magnetic resonance imaging. D: echocardiogram at 12 days.

Pheochromocytoma is a tumor derived from catecholamine-producing chromaffin cells. Although the most characteristic trait of these tumors is paroxysmal hypertension, 50% of patients present with “fixed” HBP and around 10% have normal blood pressure. Catecholamine-induced cardiomyopathy is a known complication that may present with hypertrophy or dilatation, and there have been reports of partial or total reversion.⁴

Stress cardiomyopathy is a recently identified cardiac syndrome with many undefined aspects. Various theories attempt to explain its possible pathophysiology; however, the etiological mechanism is not presently known. Because of the form of presentation, it is suspected that stress may be closely linked to its pathophysiology. Therefore, for some authors, excessively high release of stress-produced catecholamines would be the cause.⁵⁻⁷

In view of this case, we could ask whether the patient had experienced a stress cardiomyopathy or pheochromocytoma-induced myocardial disease. Although she had undergone recent stress (knowledge of a friend’s illness), which could have caused the symptoms, it is true that the pheochromocytoma itself could have triggered the “nervous” condition. In the international literature, diagnostic criteria for stress cardiomyopathy have been proposed by various authors, but none have been clearly defined and accepted.^{3,8,9} For all of these, however, the presence of pheochromocytoma would be reason to rule out a diagnosis of stress cardiomyopathy. Nonetheless, because some of the stress cardiomyopathy cases described present supraphysiological catecholamine elevations, it is reasonable to believe they may share the same

pathophysiological mechanism as pheochromocytoma-related cardiomyopathy.^{6,10} Thus, this case could be considered stress cardiomyopathy secondary to pheochromocytoma. Based on these data, we suggest the following terminology: stress cardiomyopathy or primary stress cardiomyopathy when it presents in the context of a physical or emotional stress, and secondary stress cardiomyopathy when there is a cause (possibly related to catecholamine release) such as pheochromocytoma, subarachnoid hemorrhage, etc.

Lastly, we would like to emphasize the need to measure blood and urine catecholamines when performing the differential diagnosis of stress cardiomyopathy, even when hypertension or pheochromocytoma symptoms are not present. Further studies are needed to clarify the pathophysiology of stress cardiomyopathy and lay the groundwork for a common nomenclature that will facilitate our understanding of this intriguing cardiac syndrome.

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