

ADAM M. MAY, MDDepartment of Cardiovascular Diseases,
Mayo Clinic, Rochester, MN**KOROSH SHARAIN, MD**Division of General Internal Medicine,
Mayo Clinic, Rochester, MN**JORGE BRENES-SALAZAR, MD**Department of Cardiovascular Diseases,
Mayo Clinic, Rochester, MN**LAWRENCE J. SINAK, MD**Department of Cardiovascular Diseases,
Mayo Clinic, Rochester, MN

This is not an acute coronary syndrome

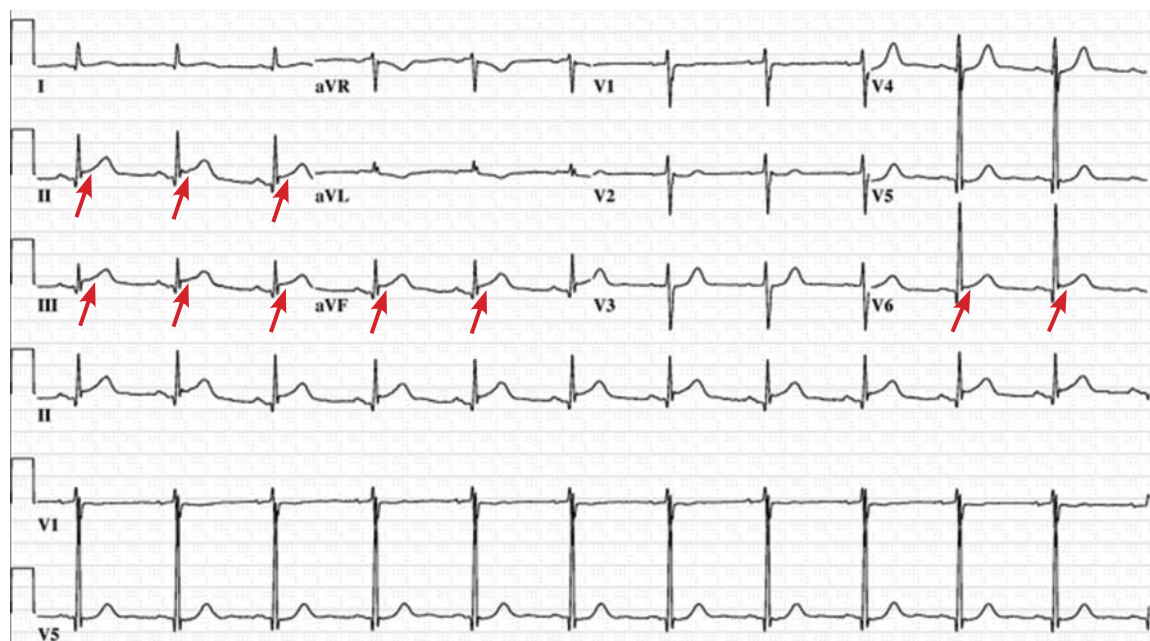


FIGURE 1. The initial 12-lead electrocardiogram demonstrated a concave 2.0-mm ST-segment elevation in leads II, III, and aVF, and a 1.0-mm ST-segment elevation in lead V₆.

A 72-YEAR-OLD WOMAN presented to the emergency room with persistent substernal chest discomfort. The initial electrocardiogram (ECG) showed 2.0-mm ST-segment elevation in leads II, III, and aVF, and 1.0-mm ST-segment elevation in lead V₆ (Figure 1). The index troponin T level was 1.5 ng/mL (reference range < 0.01). ST-elevation myocardial infarction protocols were activated, and she was taken for urgent catheterization.

Coronary angiography showed normal coronary arteries. However, intraprocedural left ventriculography identified circumferential midventricular and apical akinesis with compensatory basal hyperkinesis (Figure 2).

Further inquiry into the patient's medical history

revealed that she had been experiencing psychological distress brought on by the failure of businesses she owned.

Transthoracic echocardiography subsequently verified a depressed ejection fraction (30%) with prominent apical and midventricular wall akinesis, thus confirming the diagnosis of stress cardiomyopathy. She was discharged home on a low-dose beta-blocker and an angiotensin-converting enzyme inhibitor, and within 6 weeks her systolic function had completely returned to normal.

■ STRESS CARDIOMYOPATHY: CAUSES, DIAGNOSIS, PROGNOSIS

Stress cardiomyopathy—also called broken heart syndrome, stress-induced cardiomyopathy, takotsubo cardiomyopathy, and apical ballooning syndrome—is

doi:10.3949/ccjm.83a.15060

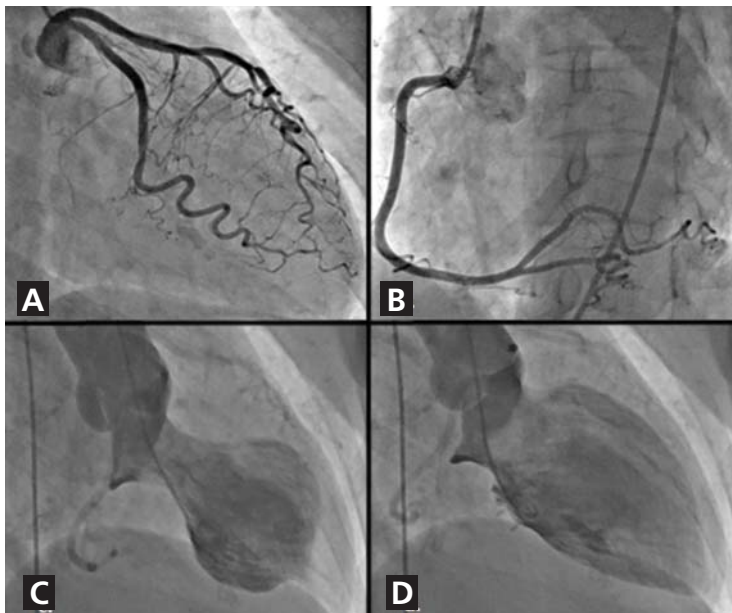


FIGURE 2. (A) Normal left coronary artery and branches, right anterior oblique caudal view. (B) Normal right coronary artery and branches, left anterior oblique cranial view. (C) Left ventriculogram in systole, left anterior oblique projection, displays midventricular and apical akinesis with “ballooning.” (D) Left ventriculogram in diastole, left anterior oblique projection.

an increasingly recognized acquired cardiomyopathy that typically affects older postmenopausal women exposed to a triggering stressor such as severe medical illness, major surgery, or a psychologically stressful life event.^{1,2}

Our patient's acute presentation is a classic example of how stress cardiomyopathy can be indistinguishable from acute coronary syndrome. It has been estimated that 1% to 2% of patients presenting with an initial diagnosis of acute coronary syndrome actually have stress cardiomyopathy.²

REFERENCES

1. Bybee KA, Kara T, Prasad A, et al. Systematic review: transient left ventricular apical ballooning: a syndrome that mimics ST-segment elevation myocardial infarction. *Ann Intern Med* 2004; 141:858–865.
2. Prasad A, Lerman A, Rihal CS. Apical ballooning syndrome (takotsubo or stress cardiomyopathy): a mimic of acute myocardial infarction. *Am Heart J* 2008; 155:408–417.
3. Bennett J, Ferdinande B, Kayaert P, et al. Time course of electrocardiographic changes in transient left ventricular ballooning syndrome. *Int J Cardiol* 2013; 169:276–280.
4. Madias JE. Transient attenuation of the amplitude of the QRS complexes in the diagnosis of takotsubo syndrome. *Eur Heart J Acute Cardiovasc Care* 2014; 3:28–36.
5. Nascimento FO, Yang S, Larrauri-Reyes M, et al. Usefulness of the troponin-ejection fraction product to differentiate stress cardiomyopathy from ST-segment elevation myocardial infarction. *Am J Cardiol* 2014; 113:429–433.

6. De Backer O, Debonnaire P, Gevaert S, Missault L, Gheeraert P, Muyldermans L. Prevalence, associated factors and management implications of left ventricular outflow tract obstruction in takotsubo cardiomyopathy: a two-year, two-center experience. *BMC Cardiovasc Disord* 2014; 14:147.
7. Syed FF, Asirvatham SJ, Francis J. Arrhythmia occurrence with takotsubo cardiomyopathy: a literature review. *Europace* 2011; 13:780–788.
8. Elesber AA, Prasad A, Lennon RJ, Wright RS, Lerman A, Rihal CS. Four-year recurrence rate and prognosis of the apical ballooning syndrome. *J Am Coll Cardiol* 2007; 50:448–452.

ADDRESS: Adam M. May, MD, Division of General Internal Medicine, Mayo Clinic, 200 1st Street SW, Rochester, MN 55905; May.adam@mayo.edu

Diagnostic criteria

The diagnosis of stress cardiomyopathy can be established when coronary angiography reveals nonobstructive coronary arteries in patients with abnormal ventricular wall motion identified on echocardiography or ventriculography, or both. These findings are part of the proposed diagnostic criteria²:

- Transient hypokinesis, akinesis, or dyskinesis of the left ventricle midsegments, with or without apical involvement; regional wall motion abnormalities extending beyond a single epicardial vascular distribution; usually, a psychological or physiologic stressor is present
- No obstructive coronary disease or no angiographic evidence of acute plaque rupture
- New abnormalities on ECG, or modest elevation in cardiac enzymes
- No evidence of pheochromocytoma or myocarditis.²

Other characteristics that help to differentiate stress cardiomyopathy from acute coronary syndrome include a prolonged QTc interval, attenuation of the QRS amplitude, and a decreased troponin-ejection fraction product.^{3–5}

Prognosis

The prognosis is generally excellent, with most patients achieving full recovery of myocardial function within several weeks.² However, in the acute setting, there are relatively high rates of acute heart failure (44% to 46%), left ventricular outflow tract obstruction (19%), and unstable ventricular arrhythmias (3.4%), including torsades de pointes.^{1,2,6,7}

Stress cardiomyopathy recurs in approximately 11% of patients within 4 years.⁸ Death is considered a rare complication but has occurred in as many as 8% of reported cases.¹ ■