Biventricular Takotsubo Cardiomyopathy in a Heart Transplant Recipient

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A 64-year-old man who had undergone cardiac transplantation for ischemic cardiomyopathy 9 years earlier was admitted to the hospital for malaise and fever of unknown origin. His posttransplantation course had been complicated by transplant vasculopathy requiring percutaneous coronary intervention 2 years earlier. His immunosuppressant regimen included cyclosporine, mycophenolate mofetil, and low-dose steroids. On admission, he denied having chest pain, but his high-sensitivity troponin I level was elevated at 17 µg/L (normal range, 0–0.045 µg/L). His ECG was unremarkable. Echocardiography demonstrated extensive posterior wall akinesia but no other regional wall motion abnormalities. Ejection fraction was estimated at 60%. Urgent coronary angiography demonstrated subtotal occlusion of the left circumflex artery. Appropriate antibiotic therapy was initiated, and possible sources of infection were ruled out by transesophageal echocardiography and thoracoabdominal computed tomography scan. Two days later, the patient was taken back to the catheterization laboratory and treated by implantation of a drug-eluting stent.

One week later, while still in the hospital, he developed sudden onset of dyspnea accompanied by a drop in oxygen saturation and was admitted to the intensive care unit. His chest x-ray demonstrated pulmonary venous congestion. His amino-terminal pro-brain natriuretic peptide was markedly increased at 40499 ng/mL (normal range, 0–125 ng/mL). The patient’s cardiac enzymes were as follows: high-sensitivity troponin I, 6.368 µg/L (normal range, 0–0.045 µg/L); creatine kinase, 207 U/L (normal range, 35–171 U/L); and isoenzyme creatine phosphokinase-MB, 22 U/L (normal range, 0–24 U/L). Urgent echocardiography revealed severe akinesia/dyskinesia of the mid and apical portions of both ventricles (Movies I and II in the online-only Data Supplement). Three-dimensional echocardiography performed 1 day later confirmed these findings (Figure [A]). Significant coronary artery obstruction was excluded by repeat coronary angiography (Figure [B]). His ECG demonstrated new T-wave inversions in leads I, II, aVL, aVF, and V<sub>6</sub> through V<sub>8</sub> (Figure [C]). Follow-up echocardiography 10 days later (Movies III and IV in the online-only Data Supplement) showed reversal of all wall motion abnormalities except for posterior wall akinesia/dyskinesia (Figure [D]).

Takotsubo cardiomyopathy (TC) is characterized by an acute reversible dysfunction of the myocardium unrelated to obstructive coronary artery disease or myocarditis. Disturbances of myocardial microcirculation and increased sympathetic activity caused by excessive local release of catecholamines (ie, epinephrine, norepinephrine, and dopamine), which in turn may lead to microvascular spasms or myocyte injury, have been implicated in the pathophysiology of this disease entity. To the best of our knowledge, our case is the first description of spontaneously occurring biventricular TC in a heart transplantation patient. There is only 1 other report in the literature of TC occurring during dobutamine stress echocardiography. Gastwirth et al<sup>2</sup> reported a 55-year-old woman who underwent dobutamine stress echocardiography 1 year after heart transplantation. The patient developed mild anterior hypokinesis at peak stress that worsened significantly during the recovery phase, affecting the entire middle and apical left ventricle. She remained asymptomatic during the test, and subsequent coronary angiography did not show evidence of coronary artery disease or coronary vasospasm. The authors speculated that loss of inhibitory parasympathetic innervation may render transplanted hearts more susceptible to the development of TC because these hearts may exhibit an exaggerated response to catecholamines.

Complete allograft denervation commonly occurs during heart transplantation. However, using metaiodobenzylguanidine scintigraphy, Buendia-Fuentes et al<sup>3</sup> were able to demonstrate that sympathetic reinnervation occurs and is present in up to 40% of recipients at 1 year after heart transplantation. Therefore, it is conceivable that sympathetic reinnervation had already occurred in our patient. Of note, our patient did not complain about chest pain, which is often present in patients with TC. Therefore, one may speculate that the nociceptive sensory affereces had not recovered in our patient.

Another interesting feature of TC in this case is its close temporal proximity to the episode of acute coronary syndrome because these entities are considered to be mutually exclusive. However, the extent of wall motion abnormalities beyond a single coronary artery territory on echocardiography, the development of new and widespread T-wave inversions on the ECG, and the exclusion of coronary obstruction on repeat coronary angiography clearly favor TC as the most likely diagnosis.

This case also highlights the necessity for including TC in the differential diagnosis of sudden-onset dyspnea requiring
admission to the intensive care unit. Published studies\(^4\) indicate that TC is not an uncommon finding among patients admitted to the intensive care unit, and unless specifically sought echocardiographically, it can be missed.

In conclusion, TC can occur in heart transplant recipients and should be included in the differential diagnosis of dyspnea and chest pain in this subset of patients. Whether sympathetic reinnervation is a condition sine qua non for developing TC in these patients remains unclear.

**Disclosures**

None.

**References**


**Figure.** Three-dimensional echocardiography revealed severe akinesia/dyskinesia of the mid and apical portions of both ventricles (A). Significant coronary artery obstruction was excluded by repeat coronary angiography (B). ECG demonstrated new T-wave inversions in leads I, II, aVL, aVF, and V\(_3\) through V\(_6\) (C). Follow-up echocardiography 10 days later showed reversal of wall motion abnormalities (D).
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Movie Legend

**Movies 1 and 2.** Echocardiographic examinations revealed severe akinesia/dyskinesia of the mid- and apical portions of both ventricles. Best viewed with Windows Media Player.

**Movies 3 and 4.** Follow-up echocardiography 10 days later showed reversal of all wall-motion abnormalities except for posterior wall akinesia/dyskinesia. Best viewed with Windows Media Player.