

# Takotsubo Cardiomyopathy after Head and Neck Reconstructive Surgery

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**Summary:** Takotsubo cardiomyopathy (TCM) is a form of transient heart failure that clinically mimics acute coronary syndrome and is characterized by left ventricular wall motion abnormalities. The pathophysiology of TCM is not well established. TCM is often preceded by emotional or physical stress and may occur after surgery. We present 3 cases of TCM occurring after head and neck reconstructive surgery. Echocardiography plays a central role in the diagnosis of TCM. Left ventricular wall motion abnormalities extend beyond the territory of a single coronary artery. Coronary angiography and cardiac computed tomography can demonstrate the absence of coronary atherosclerosis and are useful for confirming the diagnosis of TCM. Particularly after reconstructive surgery, it is necessary to carefully monitor fluid replacement to avoid dehydration, which may compromise flap blood flow, although congestive heart failure is the most common complication of TCM. It is important to encourage ambulation as soon as possible, while considering the degree of cardiac impairment. (*Plast Reconstr Surg Glob Open* 2017;5:e1366; doi: 10.1097/GOX.0000000000001366; Published online 28 June 2017.)

First reported in 1990,<sup>1</sup> takotsubo cardiomyopathy (TCM) is a form of transient heart failure that mimics acute coronary syndrome with respect to symptoms, such as chest pain and dyspnea, as well as electrocardiographic changes. Left ventricular wall motion abnormalities in TCM involve akinesia, hypokinesia, or dyskinesia of the apical and middle segments of the left ventricle and hyperkinesia of the basal segments.<sup>2</sup> The pathophysiology of TCM is not well established, although several hypotheses, such as multivessel epicardial coronary artery spasm, coronary microvascular impairment, catecholamine cardiotoxicity, and neurogenic stunned myocardium, have been proposed.<sup>3</sup> TCM typically occurs in elderly women as a consequence of emotional stress.<sup>4</sup> The prognosis of TCM is generally favorable, with the wall motion abnormalities usually resolving spontaneously within a few weeks; however, a small subset of individuals have potentially life-threatening complications.<sup>5</sup> We pres-

ent here 3 cases of TCM occurring after head and neck reconstructive surgery.

## CASE PRESENTATIONS

### Case 1

An 86-year-old man with tongue cancer underwent segmental resection of the mandible and immediate reconstruction using a pectoralis major myocutaneous flap with a titanium reconstruction plate. Although atrial fibrillation was observed on his electrocardiogram before surgery, no wall motion abnormality was observed on his echocardiogram. He became delirious and tachycardic immediately after surgery. Inverted T waves appeared on his electrocardiogram on postoperative day (POD) 1. His echocardiogram at that time revealed left ventricle apical hypokinesia with no basal segment motion abnormality. Laboratory tests showed a normal serum creatine kinase-MB (CK-MB) isoenzyme. Nicorandil was administered prophylactically based on the diagnosis of TCM. The man's respiratory condition gradually improved, and he started walking on POD 8. Improvement of apical wall motion was confirmed on the echocardiogram performed on POD 15.

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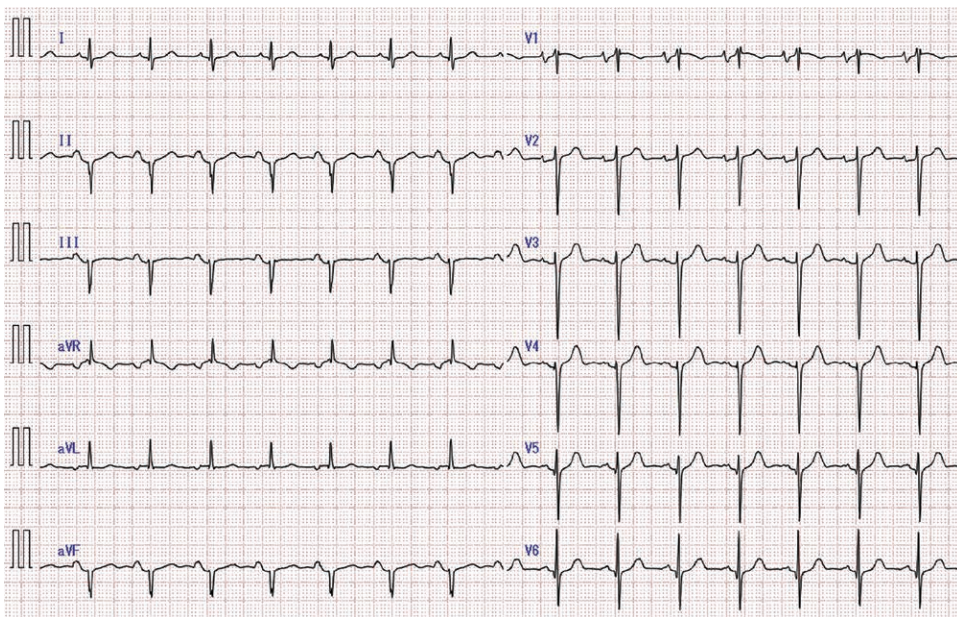
**Case 2**

A 74-year-old woman with tongue cancer underwent hemiglossectomy and reconstruction using a free rectus abdominis myocutaneous flap. Although her preoperative electrocardiogram indicated a possible previous myocardial infarction (Fig. 1), normal wall motion was observed on echocardiography, and no coronary artery stenosis was detected by cardiac computed tomography (CT). On POD 1, she was discharged from the intensive care unit and could ambulate. On POD 5, however, the woman developed chest pain and inverted T waves on her electrocardiogram (Fig. 2). At that time, her echocardiogram revealed a left ventricular wall motion abnormality characteristic of TCM, and her cardiac CT showed no coronary artery stenosis. Laboratory tests showed a normal serum CK-MB and a

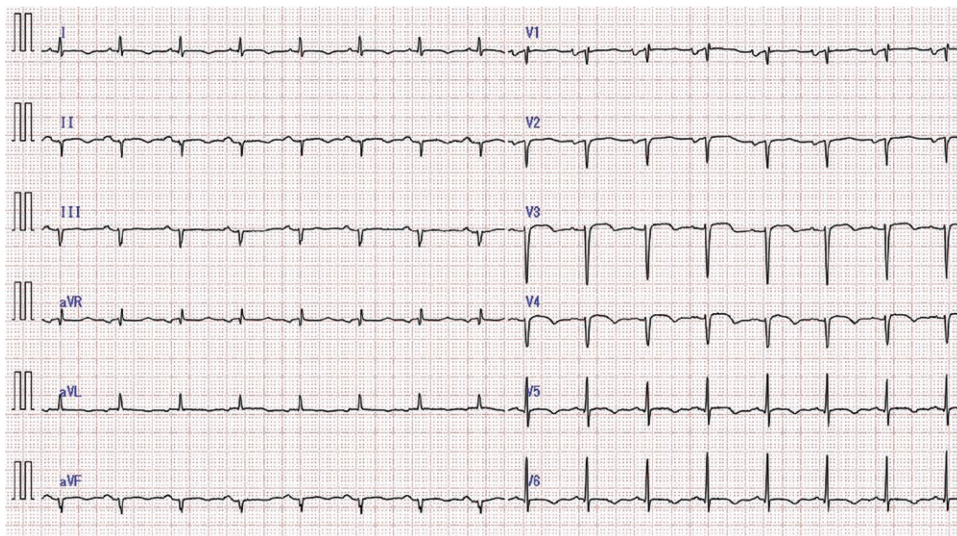
slightly elevated serum troponin T. Nicorandil was administered prophylactically. The woman's general condition gradually improved, and she restarted walking on POD 13. Improved wall motion was confirmed by echocardiography on POD 27.

**Case 3**

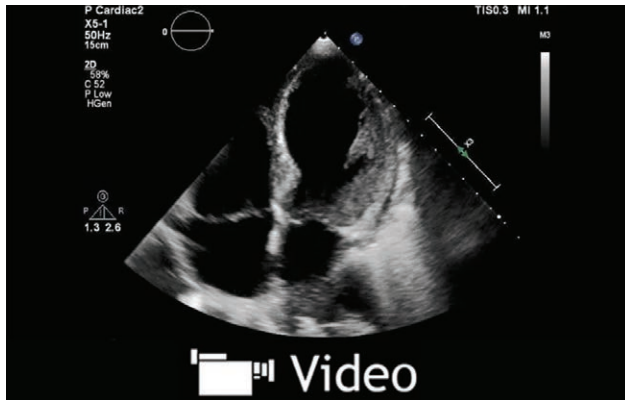
An 83-year-old man with hypopharyngeal cancer underwent total pharyngolaryngoesophagectomy and reconstruction by free jejunal transplantation. Preoperatively, a complete right bundle branch block and inverted T waves were observed on his electrocardiogram, but no wall motion abnormality was noted on his echocardiogram. He started ambulating on POD 1. On POD 2, he complained of dyspnea, and atrial fibrillation appeared on his



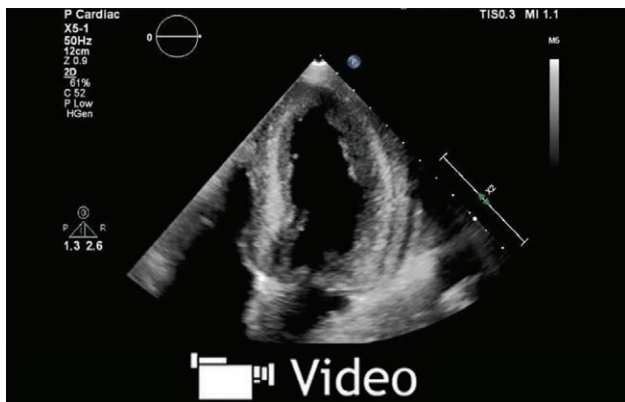
**Fig. 1.** The preoperative electrocardiogram (12-lead) of case 2.



**Fig. 2.** The electrocardiogram (12-lead) of case 2 on POD 5. Inverted T waves appeared.



**Video Graphic 1.** See Supplemental Digital Content 1, which shows the echocardiography (4-chamber view) of case 3 on POD 2, <http://links.lww.com/PRSGO/A463>.



**Video Graphic 2.** See Supplemental Digital Content 2, which shows the echocardiography (4-chamber view) of case 3 on POD 15. The cardiac function has recovered to almost normal, <http://links.lww.com/PRSGO/A464>.

electrocardiogram. Hypokinesia of the apical and middle segments of the left ventricle was observed on the echocardiogram [see video, Supplemental Digital Content 1, which shows the echocardiography (4-chamber view) of case 3 on POD 2, <http://links.lww.com/PRSGO/A463>]. His serum CK-MB was not elevated. Pilsicainide (a sodium channel blocker) and furosemide were administered. The next day, digoxin was added for atrial fibrillation, and dobutamine was started for hypotension. Cardiac CT confirmed the absence of coronary artery stenosis. Improved apical wall motion was observed on the echocardiogram obtained on POD 8, and the man restarted walking on POD 9. A repeated echocardiogram on POD 15 revealed almost normal cardiac function [see video, Supplemental Digital Content 2, which shows the echocardiography (4-chamber view) of case 3 on POD 15, <http://links.lww.com/PRSGO/A464>].

## DISCUSSION

TCM is typically preceded by physical or emotional stress. Prior physical stress is more common in male patients than in female patients, whereas emotional stress

is more common in females.<sup>1,6</sup> There are some reports about TCM after surgery.<sup>1,7</sup> Because patients undergoing head and neck reconstructive surgery are exposed to excessive physical stresses that are often greater than those associated with other operations, they are assumed to have a higher risk of TCM. Although TCM was initially believed to be a rare disease, it is now estimated that patients with TCM account for approximately 2% of all the patients with suspected acute coronary syndrome.<sup>8</sup> We think that many cases after surgery are missed or misdiagnosed as acute coronary syndrome.

There is no established method for preventing the onset of TCM. It should be noted that TCM occurs not only immediately after surgery. In 2 of our cases, TCM developed after discharge from the intensive care unit. When diagnosing TCM, it is vital to differentiate TCM from acute coronary syndrome. Echocardiography plays a central role in diagnosing TCM. Left ventricular wall motion abnormalities extend beyond the territory of a single coronary artery.<sup>5</sup> In our cases, we observed the characteristic findings of TCM by echocardiography. Coronary angiography and cardiac CT can demonstrate the absence of coronary atherosclerosis and are useful for confirming the diagnosis of TCM.<sup>9,10</sup>

Because there is no specific treatment for TCM, symptomatic treatment is administered for the accompanying heart failure.<sup>8</sup> Particularly after reconstructive surgery, it is necessary to monitor fluid replacement carefully to avoid dehydration, which may compromise flap blood flow, although congestive heart failure is the most common complication of TCM. To reduce postoperative complications, it is important to encourage ambulation as soon as possible, while considering the degree of cardiac impairment. In our hospital, patients are normally allowed to walk on POD 1 after head and neck surgery, regardless of whether vascular anastomoses have been performed. In our cases, all patients were able to start walking within 8 days after the onset of TCM.

## CONCLUSIONS

TCM may develop after head and neck reconstructive surgery. Echocardiography plays a central role in the diagnosis of TCM. It is important to carefully monitor fluid replacement and encourage ambulation when managing postoperative TCM.

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