

# Takotsubo cardiomyopathy following head and neck surgery: Can the fear of disfigurement be blamed?

### ABSTRACT

Takotsubo cardiomyopathy is accompanied by transitory left ventricular dysfunction without substantial coronary artery disease. A history of acute physical or mental stress typically precedes such a presentation. We want to highlight a case of Takotsubo cardiomyopathy in the early postoperative period in a young female patient who underwent extensive surgery for buccal mucosal carcinoma. The onset of this cardiomyopathy can be ascribed to a fear of disfigurement and prolonged surgical stress.

**Key words:** Disfigurement, left ventricular dysfunction, surgical stress, Takotsubo cardiomyopathy

### Introduction

Takotsubo cardiomyopathy or broken heart syndrome is usually a diagnosis of exclusion. The presentation mimics acute coronary syndrome (ACS) with electrocardiogram (ECG) changes and minimally elevated cardiac enzymes. ACS can be excluded after coronary angiography (CAG). There is usually a history of intense physical or emotional stress preceding such a presentation. Surgical stress can contribute to the surge of catecholamine, which impairs ventricular functions with a unique wall motion abnormality leading to a balloon-like appearance of the ventricle on echocardiography.<sup>[1]</sup>

We want to highlight a case of Takotsubo cardiomyopathy in a patient who underwent prolonged surgery for carcinoma of buccal mucosa in the immediate postoperative period. Fear of disfigurement, oncological surgery, and prolonged

surgical stress can be attributed to the development of this cardiomyopathy. Informed written consent was obtained from the patient to publish this case report.

### Case Presentation

A 35-year-old female patient with squamous cell carcinoma of buccal mucosa, with no comorbidities, underwent wide local excision and modified radical neck dissection with free anterolateral thigh flap followed by tracheostomy. The surgery lasted more than 10 h and the patient was shifted to the intensive care unit (ICU) on minimal noradrenaline support. Subsequently, she was explored for thrombosed arterial anastomosis within 6 h. The surgery went well, and the patient was shifted back to the ICU on minimal noradrenaline support with a heart rate of 115/min, blood

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**DARSHANA KIRTIKUMAR RATHOD, ANKUR SHARMA<sup>1</sup>, NIVEDITA SHARMA<sup>2</sup>, ATUL KAUSHIK<sup>3</sup>, SHILPI KARMAKAR<sup>4</sup>**

Departments of Anesthesiology and Critical Care, <sup>1</sup>Trauma and Emergency (Anesthesiology), <sup>2</sup>Surgical Oncology, <sup>3</sup>Cardiology and <sup>4</sup>Burns and Plastic Surgery, AIIMS, Jodhpur, Rajasthan, India

**Address for correspondence:** Dr. Ankur Sharma, 58, Subhash Nagar -2, Jodhpur - 342 008, Rajasthan, India.  
E-mail: ankuranaesthesia@gmail.com

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pressure of 110/78 mm Hg, and oxygen saturation of 99%. On 12 lead electrocardiogram (ECG), there was ST elevation in V1-V6, II, III, augmented vector foot (aVF) leads, and prolonged QT interval. A bedside two-dimensional (2D) echocardiogram done by the ICU fellow showed anterolateral hypokinesia with a left ventricle (LV) ejection fraction of 30–35%. The cardiologist also did an echocardiogram, which showed distal LV septum and apex hypokinesia and akinetic LV apex. The provisional differential diagnosis included perioperative myocardial infarction (MI) and stress-induced cardiomyopathy. Therefore, unfractionated heparin, T. clopidogrel, T. aspirin, and T. atorvastatin were started. Troponin-I was negative, and PRO-B-type natriuretic peptide was 368 pg/mL, which increased to 756 pg/mL on day 2 postoperatively.

A computerized tomography (CT) coronary angiogram was performed to exclude the ACS. It showed no obstruction in coronaries. It showed hypokinesia involving the LV apex and all segments at an apical and mid-ventricular level, along with severe LV systolic dysfunction.

On postoperative day 3, the flap developed necrotic changes and needed to be explored. The patient was taken to the emergency operation theater for exploration. The surgery went well, and the patient was shifted back to ICU on minimal noradrenaline support.

Cardiac magnetic resonance imaging (MRI) was done on postoperative day 6 and showed improved ejection fraction to 45% and mild hypokinesia involving all the segments at the apical and midventricular level and LV apex with normal contraction at the basal level. This was suggestive of the recovery phase of stress cardiomyopathy. On postoperative day 10, she was shifted to the ward with stable vitals. Her left ventricular systolic function improved gradually. In follow-up after 6 weeks, her LV dimensions were normal, and LV function recovered to normal with no residual regional wall motion abnormality.

## Discussion

Takotsubo cardiomyopathy was described for the first time in Japan in 1990. The precise incidence is unknown; it is believed that this cardiomyopathy affects between 0.5% and 2% of all individuals with acute coronary syndrome (ACS) symptoms. Most of the patients are postmenopausal women, with an average age of 65–70 years.<sup>[2]</sup>

For diagnosis of Takotsubo syndrome, four criteria need to be fulfilled. These include transient wall motion abnormality involving left ventricular midsegments, sometimes apical

involvement, ECG abnormalities (ST-segment elevation and/or T-wave inversion) or elevated cardiac troponin with patent coronaries, and absence of recent significant head trauma, intracranial bleeding, pheochromocytoma, myocarditis, and hypertrophic cardiomyopathy. The confirmation of the diagnosis is made only after coronary angiography or CT-angiography.<sup>[1]</sup> There is usually a positive history of intense physical or emotional stress.

Our patient had undergone prolonged head-neck surgery with re-exploration done within 6 h. The patient developed ECG changes with left ventricular dysfunction resulting in a low ejection fraction. CT-angiography showed patent coronaries. The case was labeled as Takotsubo syndrome.

Another diagnostic score is InterTAK Diagnostic score [Table 1] as per the Expert Consensus Document published in European Heart Journal.<sup>[3]</sup> Our patient was female, and she had an emotional and physical trigger of disfigurement and QT prolongation. The total score was >50, which was in favor of Takotsubo cardiomyopathy. Further, we confirmed it by angiography and MRI.

The echocardiography showed unique wall motion abnormalities seen in Takotsubo cardiomyopathy, including hypokinesia of the left midventricular and apical segment along with hyperkinetic or preserved left ventricular basal segment, which gives a balloon-like appearance of the left ventricle. This produces the apical ballooning that is characteristically identified with Takotsubo cardiomyopathy.<sup>[4]</sup> Although the left ventricular involvement is most common in this cardiomyopathy, 25–42% of patients with this condition show the involvement of the right ventricle. This group falls in the high-risk category requiring more extended hospital stay owing to severe LV dysfunction and other complications.<sup>[5]</sup>

In interviewing the family, it was evident that the patient was highly concerned about her facial disfigurement as a result of surgery [Figure 1 a and b]. Emotional stress is known to cause increased catecholamine levels, which leads to impaired left ventricular ejection fraction. A study by Nef *et al.* concludes that the circulating catecholamines cause microcirculation

**Table 1: InterTak Diagnostic score**

Criteria	Points
Female sex	25
Emotional trigger	24
Physical trigger	13
Absence of ST-segment depression	12
Psychiatric disorders	11
Neurologic disorders	9
QTc prolongation	6



**Figure 1: (a) A young female patient with carcinoma buccal mucosa. (b) Facial disfigurement after surgery**

disturbance, leading to ischemic myocardial damage. Raised natriuretic peptides prevent the proliferation of fibroblasts. This can be a cause for the rapid reversal of this condition along with the reversal of histologic alterations.<sup>[6]</sup>

Although the surgery itself can act as emotional and psychological stress, many other non-psychological factors can contribute to the development of this condition, for example, intubation stress, carbon dioxide absorption, exogenous catecholamine administration, spinal cord stimulation, and excessive hemodynamic fluctuations in the perioperative period.<sup>[7]</sup>

The echocardiography findings take days to a few weeks to resolve and improve ejection fraction. Brain natriuretic peptide (BNP) levels can be monitored as they correlate well with the improvement of LV systolic function. Wittstein *et al.*<sup>[8]</sup> cited a significant decrease in the BNP levels 7–9 days after the presentation.

Templin *et al.*<sup>[4]</sup> reported that a 30-day risk of major adverse cardiac and cerebrovascular events is 5.9%. They described the mortality rate as 5.6% per year and the risk of cerebrovascular events as 1.7%.<sup>[4]</sup> Singh *et al.*,<sup>[9]</sup> in their meta-analysis, found that the recurrence rate was about 1–2%, and beat-blockers were found to be responsible for the reduction in the mortality rate as compared to angiotensin-converting enzyme inhibitors and angiotensin receptor blockers. The recurrence rate can be up to 20% in 10 years. These patients may have symptoms such as shortness of breath, chest pain, exercise intolerance, and, most commonly, fatigue, even after full recovery of left ventricular function.<sup>[10]</sup> Heart failure, cardiogenic shock, mitral insufficiency, left ventricular thrombus formation, embolic events, and right ventricular dysfunction are serious complications that may arise in the early phase of the condition.<sup>[11]</sup>

As described by Doglietto *et al.*<sup>[12]</sup> patients undergoing oncological surgery exhibit higher levels of anxiety when

compared to other surgeries (46.7% vs. 25%;  $P = 0.055$ ). Multiple factors are associated with anxiety, which includes diagnosis of cancer, surgery, chances of worsening of the condition, and waiting to undergo surgery.<sup>[12]</sup> The psychological trauma related to the consequences of surgery for head and neck cancer, owing to fear of disfigurement and negative reactions from friends and relatives.<sup>[13]</sup> These circumstances may have contributed to the development of stress cardiomyopathy in our patient.

## Conclusions

Takotsubo cardiomyopathy is distinguished by transitory left ventricle dysfunction in the absence of substantial coronary artery disease. Fear of disfigurement in a young female can precipitate this event and lead to considerable morbidity.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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