

## Letter to the Editor

## Takotsubo Cardiomyopathy associated with myasthenic crisis: An Illustrative Case



### 1. Introduction

We are aware of myasthenic crisis (MC) and the associated clinical signs and symptoms.

One of the lesser known and often underdiagnosed complications associated with myasthenic crisis is Takotsubo Cardiomyopathy (TC), Broken Heart Syndrome or Stress Cardiomyopathy.

Initially reported by Japanese cardiologists, Takotsubo derives its name from Japanese word for octopus trap, because of the left ventricular apical ballooning that is classically seen in this syndrome (Ghadri et al., 2018). Takotsubo Cardiomyopathy, is a syndrome characterized by transient and reversible regional myocardial dysfunction with various patterns of regional hyperkinesia and hypokinesia in the absence of underlying obstructive coronary artery disease (CAD), most classically with left ventricular (LV) apical hypokinesia and basal hyperkinesia resulting in apical ballooning (Bybee et al., 2004).

### 2. Case presentation

An 85 years old Caucasian man was admitted with a productive cough for 5 days, being treated as infective exacerbation of chronic obstructive pulmonary disease (COPD). His breathing worsened on admission and he was transferred to intensive care and started on non-invasive ventilation.

He was also found to have profound muscular weakness (power 3-/5 in lower limbs and 3/5 in upper limbs; reflexes -absent in lower limbs; sluggish in upper limbs). No cranial nerve abnormalities seen on examination. His past medical history included COPD and Type II diabetes mellitus.

Investigations conducted as inpatient revealed raised Troponin I 3000 ng/L (0–34) and anterior ST segment elevation on 12-lead electrocardiogram. Nerve conduction studies (NCS) and electromyography (EMG) was requested based on the profound muscular weakness, which revealed significant (>10%) decrement in amplitude on repetitive stimulation at 3 Hz of the left ulnar nerve pre-exercise and >20% decrement post-exercise, with forced abduction of the fifth finger for 20 s (Fig. 1). Transthoracic echocardiography showed akinesia of all 5 apical segments of the left ventricle with hyperdynamic contractility of the basal and mid-ventricular segments (Fig. 2). This distribution is typical for apical takotsubo cardiomyopathy, which is the most common form of this condition. The patient was too unstable for invasive coronary

angiography. A clinical diagnosis was made of takotsubo cardiomyopathy. Unfortunately, patient deteriorated rapidly despite commencing treatment with steroids and pyridostigmine (which were started after NCS). The acetylcholine (ACH) Receptor Antibodies and Anti-MUSK Antibodies were later revealed to be negative. He died three days later from respiratory failure. Repeat NCS and EMG was neither requested nor performed due to rapid deterioration of patient's clinical condition.

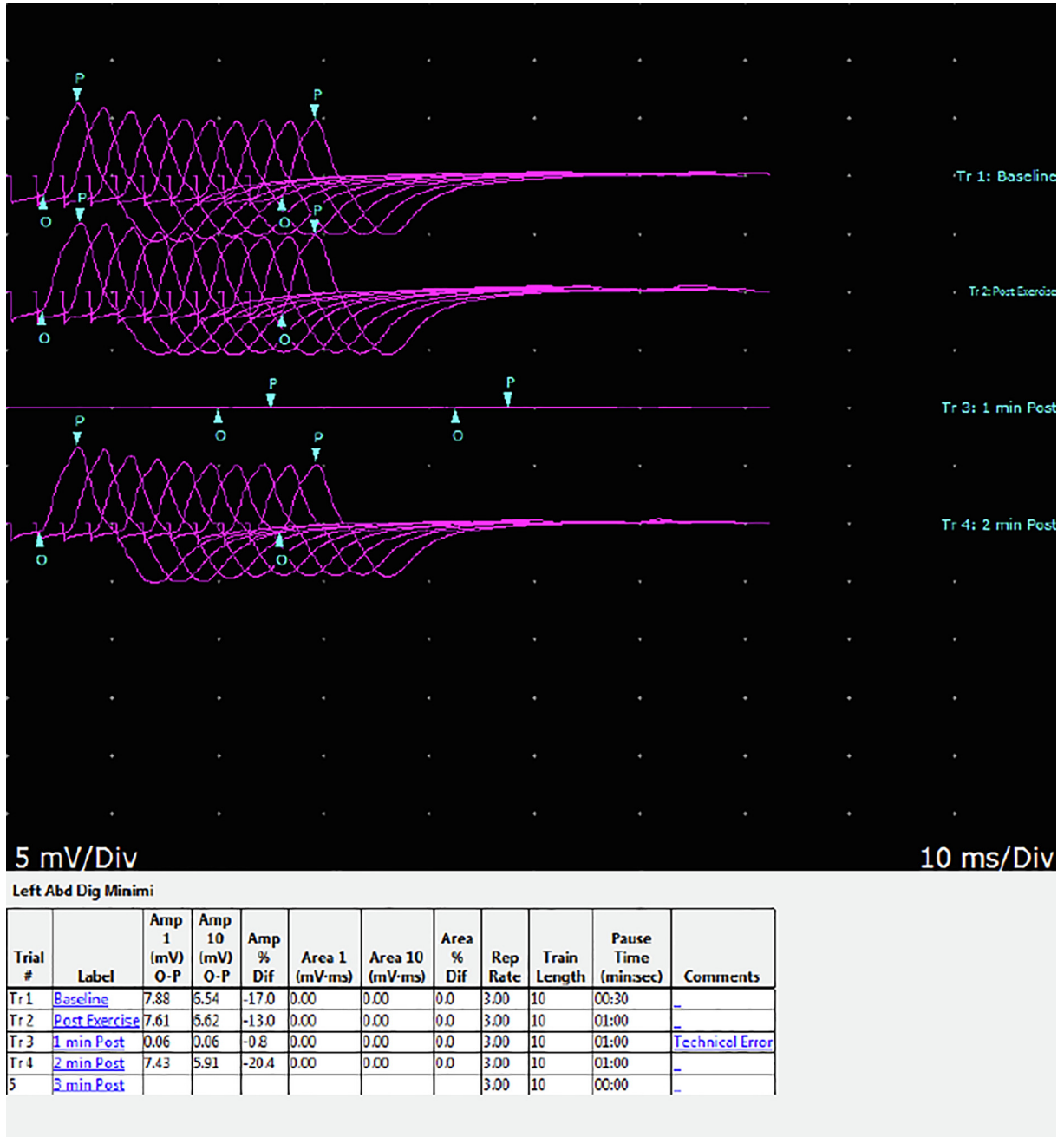
### 3. Discussion

TC is among the most commonly reported cardiac manifestations of MG, with auto-antibodies to nicotinic acetylcholine receptors (anti-AChR) primarily affecting younger women and older men (Shivamurthy and Parker, 2014). TC associated with MG most prominently appears during MC, an acute deterioration of MG typically brought on by a physical or emotional stressor that usually involves respiratory muscles resulting in respiratory failure and the need for mechanical ventilation.

The association between TC and intercurrent neurological disease is well established (Templin et al., 2015) and confers a greater risk of adverse clinical outcomes (Ghadri et al., 2018). TC in the context of an acute neurological disorder is an independent predictor of in-hospital mortality. Male sex, troponin level more than 10 times the normal limit, and left ventricular ejection fraction <45% are also associated with poor outcomes (Templin et al., 2015). Thus this patient had a number of unfavourable prognostic features from the outset.

The mechanism of myocardial dysfunction in TC is poorly understood. One potential hypothesis relates to excess of catecholaminergic stimulation, particularly during episodes of physical or emotional stress, which triggers multivessel epicardial coronary artery spasm (Ghadri et al., 2018). Further studies are indicated to unpick the mechanistic drivers of this condition on a molecular level. The patient described was not known to have MG, hence this is a rare case where TC occurred in tandem with the first presentation of MG and MC.

TC is typically characterised by reversible myocardial dysfunction with a characteristic distribution of regional wall motion abnormalities. Patients with severe TC or other severe intercurrent disease may die before resolution of myocardial dysfunction, as occurred in this case. TC can mimic myocardial infarction (Bybee et al., 2004). In some cases cardiac enzymes are modestly elevated, while in others enzymes are markedly increased (Templin et al., 2015). Hence cardiac biomarkers cannot be used to reliably distinguish TC from a myocardial infarction. The gold-standard diagnostic work-up for a patient with TC would include a coronary



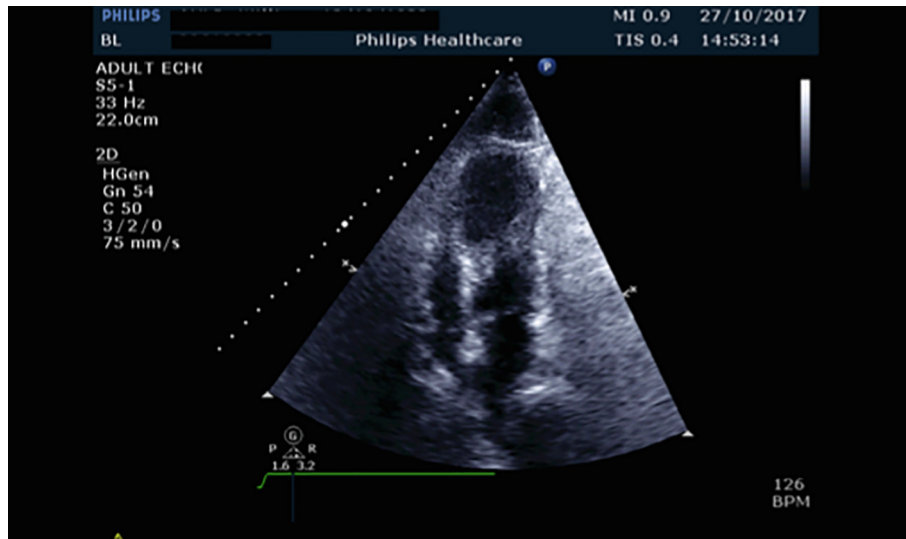
**Fig. 1.** Significant (>10%) amplitude decrement on repetitive stimulation of the left ulnar nerve pre-exercise (Train 1); post-exercise (Train 2 & 4) shows further amplitude decrement (upto >20%). Train 3-was a technical error due to sudden movement of the hand by patient and hence not taken into account.

angiogram to exclude obstructive coronary pathology. Although this was not performed in this case, due to multi-organ dysfunction and progressive instability on intensive care, there appears to be enough evidence to support a diagnosis of TC. Of note, the affected dysfunctional myocardium was found in regions subtended by all 3 major epicardial coronary arteries, rendering a coronary cause unlikely, especially given the preservation of contractility to the remainder of the left ventricle.

Antibodies can be negative at the early stages of MG (which could be the case here), hence, the importance of serial antibody testing.

**Conflict of interest**

None.



**Fig. 2.** Echocardiogram revealing apical ballooning due to hypokinesis, resembling the shape of Japanese octopus trap.

## References

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Sutapa Biswas<sup>a,\*</sup>

Daniel J Hammersley<sup>b</sup>

<sup>a</sup> *Chelsea and Westminster Hospital NHS Foundation Trust, SW10 9NH  
London, UK*

<sup>b</sup> *National Heart & Lung Institute, Dovehouse Street, London SW3 6LY,  
UK*

\* Corresponding author.

E-mail addresses: [sutapa.biswas@nhs.net](mailto:sutapa.biswas@nhs.net) (S. Biswas), [d.hammer-sley@nhs.net](mailto:d.hammer-sley@nhs.net) (D.J Hammersley)

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