

# **Takotsubo syndrome following pericardiectomy:**

## **a case report**

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### **Abstract**

**Background:** Takotsubo cardiomyopathy (TC) is defined as a temporary and reversible systolic abnormality of the left ventricle's apical area resembling myocardial infarction (MI) in the nonexistence of coronary artery disease (CAD)[1]. Only a few cases have been reported after cardiac operations or after pericardiocentesis.

**Aims:** To emphasize the need to be aware of the possibility of the occurrence of this potentially fatal complication after cardiac surgery.

**Materials and methods:** A 66-year old man underwent pericardiectomy. Postoperative he endured TC and progressed exacerbation of hemodynamic instability. Finally, he had to be supported by intra-aortic balloon pump (IABP), extracorporeal membrane oxygenation (ECMO).

**Results:** Patient's left ventricle function recovered fully in two weeks.

**Discussion:** we discussed the pathogenesis and treatment of postoperative TC.

**Conclusion:** TC has to be carefully considered in differential diagnosis in case of acute left ventricle dysfunction following cardiac surgery.

**Keywords:** pericardiectomy; takotsubo cardiomyopathy.

### **ETHICS STATEMENT**

The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

### **CASE REPORT**

A 66-year-old Chinese man diagnosed tuberculous constrictive pericarditis underwent pericardiocentesis successfully due to pericardial effusion and anti-tuberculosis drug treatment, but the treatment cannot slow the progression of the disease. Two months later, he experienced pericardiectomy. Before operation his echocardiogram indicated pericardial constriction with good cardiac function, his coronary angiogram and other routine preoperative investigations were normal. There was nothing else of significance in the past medical history.

On the day of operation, Pericardiectomy was performed straightforward without complication. After operation, he returned to intensive care unit in stable condition with sinus rhythm and a small amount of norepinephrine support because of mild hypotension. Echocardiography indicated cardiac ejection fraction (EF) 60%. Early postoperative outcome was uneventful and the patient underwent early extubation within 12 hours.

POD1 (post operation day): His ECG detected sinus tachycardia with ST-segment elevation 0.05-0.20mv (V2-V6), then he experienced progressive worsening of hypotension. He had to receive increased amount of norepinephrine. Echocardiography still indicated good cardiac output, but with regional wall motion abnormality (RWMA) with hypokinesia in left ventricular (LV) segments: left anterior wall, interventricular and apical involvement. ECG progressed to supraventricular tachycardia then ventricular tachycardia presented, ST-segment was reached the highest level 0.05-0.50mv (II, III, AVF, V1-V6) (Fig. 1). The biomarkers of myocardial injury in blood also found to be increased. As it resembles to AMI, our first management focused on the treatment of AMI including oxygen inhalation, intravenous heparin and aspirin. But the result of the following coronary angiography was unremarkable. Finally he was diagnosed with TC according to the latest Heart Failure Association of the European Society of Cardiology criteria [2].

POD2: Echocardiography indicated EF 27% with RWMA (Fig. 2). Even large doses of vasoactive drugs were difficult to maintain the hemodynamics. He had to be re-intubated then received IABP, but finally, to restore and maintain circulation stabilization he had to be supported by ECMO. As his poor heart function, he was also received the Ca<sup>+</sup>-sensitizer levosimendan. After hemodynamically stabilized, he was received b-blocker due to possible high catecholamine state.

Then his LV function gradually fully recuperated in 2 weeks (EF 53%). He was weaned of ECMO, IABP and invasive ventilator successfully. Finally, He was successfully transferred out of ICU.

## COMMENT

Here we reported a peculiar case of postoperative takotsubo syndrome following pericardiectomy, but what was special is the patient had undergone pericardiocentesis before surgery with no adverse reactions. Two months later, he was onset of TC after pericardiectomy on POD#1. The most peculiar aspect is probably the echocardiographic evidence of RWMA with good EF just a few hours after the

sudden onset of symptoms. Then, several hours later, cardiac function suddenly became poor (EF 27%), even after the arrhythmia and ST was corrected.

There are measurable differences in the clinical characteristics of perioperative TCM (pTCM) and non-pTCM, such as sex, a younger age and the onset time [3].

Any anesthetic-surgery corresponds to a stressful situation and initiates a cascade of physiological and metabolic events with a significant increase in catecholamines in plasma, which begins in the preanesthetic period and ends within three to four days postoperatively [4]. However, the actual role of catecholamines in the pathogenesis and prevention of perioperative TCM needs further exploration.

In our case, in addition to the surgical stress, pTCM may be caused by coronary microemboli, inappropriate myocardial protection, myocardial edema and inflammatory mediators. However, these hypotheses need to be supported by more prospective literature.

Other multiple proposed theories including: (1) ischemia resulting from epicardial coronary arterial spasm, caused by increased sympathetic tone from mental stress; (2) diffuse coronary microvascular dysfunction; (3) catecholamine-mediated cardiac toxicity; (4) neurogenic myocardial stunning resulting from acute autonomic dysfunction; (5) postacute coronary syndrome reperfusion injury [5].

### **Management, treatment and Prognosis for Takotsubo cardiomyopathy**

Guidelines regarding TC management are lacking. Given the reversible effects of cardiac injury, the interim management focuses on supportive care and prevention of severe complications, which frequently lead to near complete recovery [6].

#### **Initial treatment:**

In our case, during acute cardiogenic shock, initial use of exogenous catecholamine and anti-arrhythmic drugs may be necessary, but that could theoretically worsen the cardiomyopathy. In TCM patients treated with catecholamine drugs, a 20% mortality has been reported [7]. Recently, it has been suggested that the Ca<sup>+</sup>-sensitizer levosimendan could be used safely and effectively in TCM as an alternative inotrope to catecholamine agents for accelerated recovery in patients with TC [8]. For severely unstable patients, IABP, ECMO or temporary ventricular-assisted devices may be necessary.

Myocardial biopsies and histological findings are associated with catecholamine-induced injury [9]. Suggestions that  $\beta$ -blockade may be of value in patients until full recovery of LVEF due to it may be contraindicated in acute and severe heart failure with low LVEF, hypotension, and in those with bradycardia. But trials supporting this hypothesis are lacking. Perhaps by increasing the use of sympatholytic drugs such as dexmedetomidine (a highly selective  $\alpha_2$ -adrenoceptor agonist) may have applications in preventing the occurrence of perioperative TCM, but the evidence is weak [10]. Angiotensin-converting-enzyme inhibitors (ACEi) or angiotensin II receptor blockers (ARB) may potentially facilitate LV recovery.

#### **Long-term treatment:**

The use of ACEi or ARB was associated with improved survival at 1-year follow-up even after propensity matching[11]. In contrast, there was no evidence of any survival and recurrence benefit for the use of beta-blockers[12], whereas ACEi or ARB are associated with a lower prevalence of recurrence. But the significance of this observation remains uncertain.

## **CONCLUSION**

Originally TCM believed to be a benign disease but studies have shown that TCM has morbidity and mortality rates that are comparable to those of ACS. So it is very important for the perioperative physician, especially cardiothoracic surgery, who should consider this syndrome as an important component of the differential diagnosis in the any patient who suddenly decompensates in the perioperative setting.

## **CONFLICT OF INTERESTS**

The authors declare that there are no conflict of interests.

## **DATA AVAILABILITY STATEMENT**

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

## **REFERENCES**

- [1] Patankar G R , Choi J W , Schussler J M . Reverse takotsubo cardiomyopathy: two case reports and review of the literature[J]. *J Med Case Rep*, 2013, 7(1):1-3.
- [2] Lyon A R , Bossone E , Schneider B , et al. Current state of knowledge on Takotsubo syndrome: a Position Statement from the Taskforce on Takotsubo Syndrome of the Heart Failure Association of the European Society of Cardiology[J]. *European Journal of Heart Failure*, 2016;18:8- 27.
- [3] Agarwal S , Bean M G , Hata J S , et al. Perioperative Takotsubo Cardiomyopathy: A Systematic Review of Published Cases[J]. *Seminars in Cardiothoracic and Vascular Anesthesia*, 2017, 21(4):108925321770051.
- [4] Barros J , D Gomes , Caramelo S , et al. Perioperative approach of patient with takotsubo syndrome[J]. *Revista Brasileira De Anestesiologia*, 2015, 67(3).
- [5] Pelliccia F , Kaski J C , Crea F , et al. Pathophysiology of Takotsubo Syndrome[J]. *Circulation*, 2017, 135(7):2426.
- [6] Tarkin J M , Khetyar M , Kaski J C . Management of Tako-tsubo syndrome.[J]. *Cardiovasc Drugs Ther*, 2008, 22(1):71-77.
- [7] Pieroni M , Bolognese L . Takotsubo (Stress) Cardiomyopathy[J]. *New England Journal of Medicine*, 2015, 373(27):2688.
- [8] Yaman M , Arslan U , Kaya A , et al. Levosimendan accelerates recovery in patients with takotsubo cardiomyopathy.[J]. *Cardiology Journal*, 2016, 23(6).
- [9] Nef H M , Helge M , Sawa K , et al. Tako-Tsubo cardiomyopathy: intraindividual structural analysis in the acute phase and after functional recovery[J]. *European Heart Journal*, 2007(20):2456.

- [10]Madias, John E . Could dexmedetomidine have a role in patients admitted with Takotsubo syndrome?[J]. International Journal of Cardiology, 2015, 203:75.
- [11]Templin C, Ghadri JR, Diekmann J et al.Clinical Features and Outcomes of Takotsubo (Stress) Cardiomyopathy.[J]. New England Journal of Medicine, 2015, 373(10):929-38.
- [12]Singh K , Carson K , Usmani Z , et al. Systematic review and meta-analysis of incidence and correlates of recurrence of takotsubo cardiomyopathy[J]. International Journal of Cardiology, 2014, 174(3):696-701.

Fig.1 ECG of the patient detected malignant arrhythmia from sinus tachycardia to ventricular tachycardia.

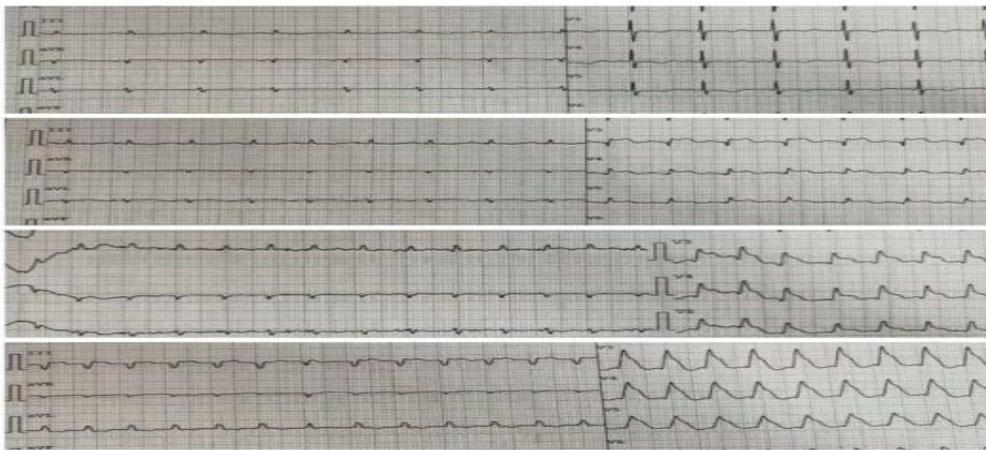


Fig.2 The word “Takotsubo” is a container which has a circular bottom and narrow neck and it resembles the heart’s condition in TC to a certain degree.



