

THE STUDY OF BROKEN HEARTS: A PRAGMATIC CASE REPORT ON TAKOTSUBO CARDIOMYOPATHY IN MALAYSIA

Humayra S¹, Mohamad R¹, Ghapar K², and Mohamed L¹.

¹Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia

²Department of Cardiology, Hospital Serdang, Jalan Puchong, 43000 Kajang, Selangor, Malaysia

Correspondence:

Dr Syeda Humayra

Faculty of Medicine, University of Cyberjaya,

Persiaran Bestari, Cyber 11,

63000 Cyberjaya, Selangor, Malaysia

Email: syedahumayra@gmail.com

Abstract

The Takotsubo syndrome is an acquired, non-ischemic stress-induced cardiomyopathy popularly known as the 'broken heart syndrome'. It is an acute left ventricular dysfunction presenting mostly in older women after an intensely stressful event. The exact pathophysiology remains elusive. The term came into existence in the early 1990s in Japan, where the distinctive change in the shape of the left ventricle with apical ballooning during systole, resembled the Takotsubo, an octopus pot used by the Japanese fisherman. From a rare under-recognized syndrome, it has been increasingly recognised as a form of acute cardiac failure. Clinical diagnosis of the syndrome may be unidentified due to its similarity with the acute coronary syndrome, but without the narrowing of coronary vessels in angiographic imaging. There is a substantial elevation of the cardiac biomarkers, troponin and the natriuretic peptides which helps in differentiating the Takotsubo syndrome from myocardial infarction. A case report of a 59-year old Malaysian lady with typical, recurrent episodes of the Takotsubo syndrome is presented.

Keywords: Takotsubo Cardiomyopathy, Broken Heart Syndrome, Stress-Induced Cardiomyopathy, Apical Ballooning Syndrome

Introduction

The Takotsubo cardiomyopathy (TTC) is an acute heart failure syndrome, with symptoms of myocardial infarction without any evidence of coronary artery obstruction. "Said et al. (1) has reported that the condition was first described in Japan by Hikaru Sato in 1990, and the story began with a 70-year-old woman getting hospitalised after a heated argument with her neighbours as reported by Akashi et al. (2).

The left ventricular wall abnormality or apical deformity that occurred during systole resembled an 'octopus pot' used by the Japanese fishermen (Figure 1). Transient apical ballooning of the left ventricular apex, with hypercontractility of the basal segment, is a defining hallmark of TTC (3). It is predominant in postmenopausal women and is often preceded by stress, physical trauma, emotional breakdown or bereavement (4, 5).

The exact pathology remained elusive though it had been hypothesized that an adrenaline surge led to



Figure 1: The left ventricular apex becomes balloon-shaped as patient experiences stressful event and takes similar shape as Japanese octopus trap

catecholamine cardiotoxicity and myocardial stunning (6, 7). The clinical diagnosis was often confirmed through an angiogram and ventriculogram which would be normal, together with the acute elevation in the cardiac biomarkers (8), the pro-B-type natriuretic peptide (pro-BNP) and the

N-terminal proB-type natriuretic peptide (NT pro-BNP) (9, 10). The other cardiac biomarkers, particularly troponin I (TnI) and troponin T (TnT) were significantly higher in 90% of the Takotsubo patients although to a lesser magnitude than were seen in the ST-segment elevation myocardial infarction (STEMI) (9, 10).

Case presentation

A 59-year-old, postmenopausal, Malaysian Indian woman was brought into the cardiology clinic at admitting hospital, after experiencing severe chest pain due to an emotionally distressing event. This was not the first time that she had experienced such chest pains. She was anxious and breathless, with the early signs of a heart attack. However, her heart rate was found to be normal at 72 bpm, and the blood pressure was about 146/89 mmHg.

She had the common chronic aging conditions such as diabetes, hypertension and dyslipidemia. She also had a family history of ischemic heart disease, but none in the family had sudden death resulting from a heart attack.

The patient had a cerebral vascular event in 2013 with no neurological sequelae, and she claimed to be independent, in her activities of daily living (ADL). She was initially diagnosed with the transient apical ballooning syndrome and with a midbrain infarct, with diplopia and syncope. She also had multiple hospital admissions for decompensated congestive cardiac failure (CCF). She had palpitations for the past year, even at rest, and experienced shortness of breath (SOB). In 2017, she was admitted for chronic CCF precipitated by supraventricular tachycardia (SVT). She was non-compliant to restriction of fluids (ROF) and had defaulted several follow-up sessions.

The diagnosis was made following laboratory investigations and imaging procedures on admission. Electrocardiography (ECG) displayed widespread profound ST-segment depression in almost all the leads with a T-wave inversion pattern. Troponin-T levels were elevated (0.86 ng/ml) and creatinine phosphokinase was normal (< 200 U/l). Coronary angiography revealed normal coronaries without any sign of stenosis from thrombus or plaque formation. Echocardiography (ECHO) showed regional wall motion abnormality and demonstrated left ventricular (LV) ejection fraction of 62%, stress-induced myocardial ischemia at the apical segment of the anterior wall, the territory of the left anterior descending coronary artery (LAD), with a mild transient perfusion defect observed only at stress. There were no signs of syncope, angina or SOB, but the patient continued to complain of giddiness.

Discussion

TTC is characterized by acute myocardial stunning and accompanied by left ventricular systolic dysfunction with distinctive apical ballooning in the absence of obstructive coronary arteries (11). The exact incidence of the disease is unknown (12). The International Takotsubo Registry investigated the clinical features, prognostic predictors, and

outcomes among TTC patients and their results indicated that it was more commonly diagnosed in females with a mean age of 66.8 years; and 71.5% patients had an evident trigger: emotional (27.7%) and physical (36%) (13).

Even though Takotsubo syndrome is more frequently recognized worldwide (14) but the clinical diagnosis was largely missed with the condition mimicking acute myocardial infarction. It presented in many ways with or without the typical stressors, with pathophysiology suggestive of circulating catecholamine myocardial toxicity (3, 6). The patient experienced her first episode of TTC when her daughter-in-law was dying in her arms, after being hit accidentally by her husband's car. However, the aetiology behind the second attack was not very clearly understood as the patient only complained of chest pain right after she felt emotionally distressed.

There is no definitive treatment for TTC, only supportive treatment. However, the first line medications of aspirin, heparin, and beta-blockers could be given at that point in time, to treat heart failure and maintain the heart rate (15).

When patients presented to an emergency department with chest pain, the management was often directed towards coronary artery disease (CAD) as it was the most likely diagnosis. According to the 2018 Statistics Report on Causes of Death in Malaysia, the number of deaths due to ischaemic heart disease (IHD) had risen from 13.9% in 2017 to 15.6% in 2018 (16).

6-7% of TTC admissions were misdiagnosed as a heart attack due to its similarity with ACS (17). Approximately 2-2.2% of the patients in the United States with symptoms of STEMI or unstable angina were ultimately diagnosed with TTC (18). Recurrence of TTC had also been reported; as seen in another case report, of a 51-year-old woman with a relapse TTC (19), with significant involvement of the apical left ventricular (LV) segment, induced by intense emotional stress (17).

The prognosis was good as more than 90% of the patients would have full recovery of the regional wall motion abnormality within 3–6 months. Complications occurred in about 10% of the cases, while in-hospital mortality was estimated to be 4.5% (20). TTC was believed to be transient and reversible until later studies funded by the British Heart Foundation revealed that there could be permanent damage to the cardiac muscles after a devastating episode of TTC (21). It was therefore critical to identify the cases and quantify the extent of the damage to the anatomy or physiology of the heart.

Conclusion

The Takotsubo cardiomyopathy is a multifactorial clinical syndrome that could mimic acute myocardial infarction but without evident coronary stenosis. Although recent studies revealed that the condition was no longer rare, further awareness was required to ensure better cardiac management, in the Malaysian healthcare system.

A recognition of the disease and its overall impact on the heart is vital for the reduction and prevention of the associated complications, recurrence and even death in Takotsubo cardiomyopathy.

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Competing Interests

The authors declare that they have no conflict of interests.

Ethical Clearance

We obtained approval from the Medical Research and Ethics Committee (MREC) and the Ministry of Health Malaysia (MOH), registered under NMRR-19-2585-47819.

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