

Heart broken by a mosquito: an unusual case of Takotsubo syndrome

Javed Majid Tai¹, Anam Haider², Bilal Hussain^{1*}

¹ Section of cardiology, Department of medicine, Aga Khan University Hospital Karachi, Pakistan; ² Department of medicine, Aga Khan University Hospital Karachi, Pakistan

Abstract

Pakistan has recently witnessed an epidemic of dengue infection and thereafter, certain various presentations of patients with dengue infection have been reported. The cardiac manifestation of dengue infection is primarily an inflammatory response to infection, however, dengue can rarely present as Takotsubo syndrome. Here, we report a the case of a 69-year-old male, who presented with fever and abdominal pain and was diagnosed with dengue fever on serological workup. Just prior to being discharged, the patient developed acute chest pain, and dyspnoea with ST-segment elevation in the anterolateral leads on electrocardiogram and raised cardiac biomarkers. An urgent coronary angiogram showed non-obstructive coronary artery disease with apical ballooning on ventriculography. On the basis of this, the patient was diagnosed as have TTS associated with dengue fever. The patient was medically treated with success and was later discharged. He remains currently asymptomatic and his left ventricular ejection fraction recovered to normal (60%) on repeat echo after 6 months. JRC D 2018; 3 (8): 278–280

Key words: rare cardiovascular disease, Dengue, Takotsubo cardiomyopathy, apical ballooning syndrome

Background

Takotsubo syndrome (TTS), also known as apical cardiac ballooning syndrome, broken heart syndrome or stress cardiomyopathy is a condition in which there is a transient left ventricular (LV) dysfunction [1]. It was reported by Sato et al. in 1990 and Dote et al. in 1991 in Japan, and since then numerous cases have been reported throughout the world [1,3]. The majority (90%) of patients are postmenopausal women, aged 65–70 years of age [1,4]. Most commonly the patient presents with chest pain and dyspnea [1,4], with electrocardiographic (ECG) changes which mimic acute myocardial infarction. It is associated with a minimal release of myocardial enzymes in the absence of obstructive coronary artery disease (CAD) [1]. The prognosis of this syndrome is generally favorable, with almost complete recovery seen in 96% of patients [1,5,6]. In TTS both emotional and physical triggers were reported. It has rarely been associated with dengue fever, with only two case reports in the literature for reference [7, 8]. We report the case of a 69-year-old male who developed Takotsubo syndrome after being diagnosed with dengue fever.

Case presentation

A 69-year-old male presented to the emergency department with complaints of fever, nausea, and abdominal pain for the previous 3 days. His past medical history was significant for hypertension, and coronary artery disease with history of prior angioplasty of the left anterior descending artery. His previous left ventricular ejection fraction (LVEF) was 60%. The patient denied chest pain and dyspnea. On examination, aside from a fever of 38.3°C, his vitals were stable. Abdomen on examination was soft, and mild tenderness was noted in the lower abdomen. He was admitted to the inpatient ward.

Initial work up revealed positive dengue serology (IgM positive) and low platelets $40 \times 10^9/L$ (reference value 150–450 $\times 10^9/L$). Supportive treatment with fluid resuscitation was initiated. The patient's fever improved by the second day of admission. Being clinically stable, he was scheduled for discharge when he started experiencing chest pain, dyspnoea, and sweating. ECG revealed ST segment elevation in the anterolateral leads (V2–V6) (Figure 1).

Please cite this article: Tai JM, Haider A, Hussain B. Heart broken by a mosquito; an unusual case of Takotsubo cardiomyopathy (RCD code: III-5B). J Rare Cardiovasc Dis. 2018; 3 (8): 278–280; doi: <http://dx.doi.org/10.20418%2Fjrcd.vol3no8.336>

Conflict of interest: none declared. Submitted: August 3, 2018. Accepted: December 15, 2018.

* Corresponding author: Section of cardiology, Department of medicine, Aga Khan University Hospital Karachi, Pakistan; tel: 0336–2195113; e-mail: bilal_observer@hotmail.com

Copyright © 2018 Journal of Rare Cardiovascular Diseases; Fundacja Dla Serca w Krakowie

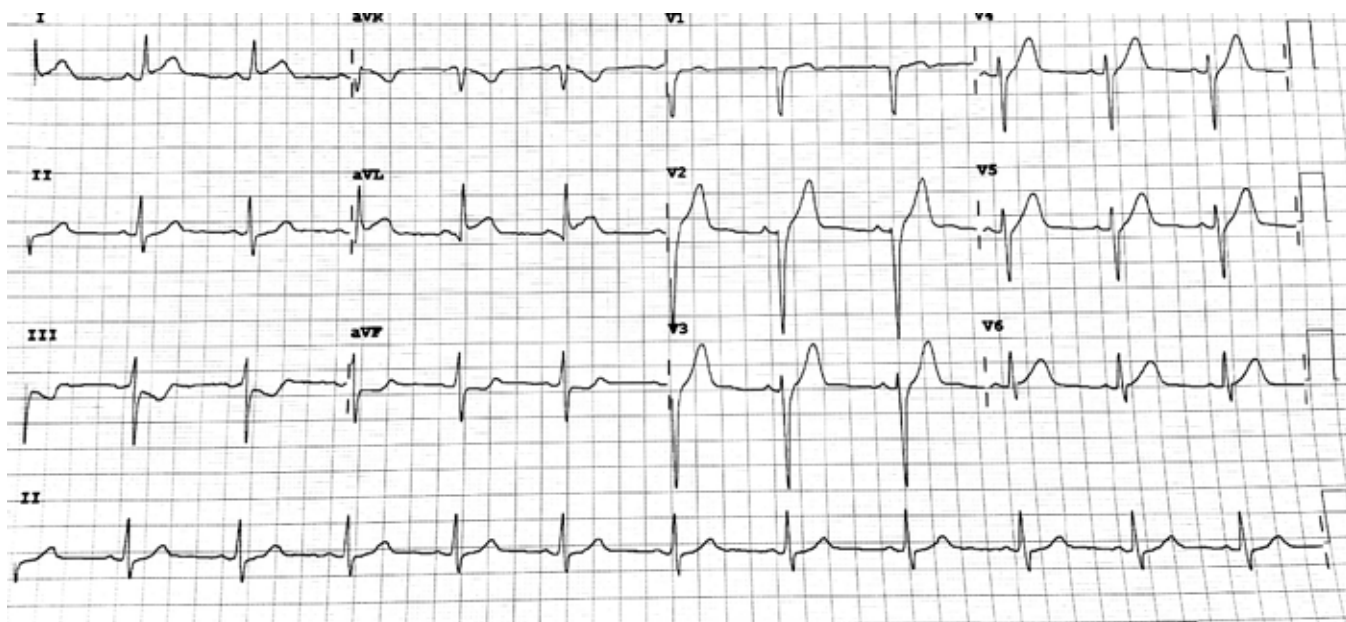


Figure 1. Electrocardiogram (ECG) showing ST elevation in anterolateral leads with reciprocal changes in inferior leads

Troponin I was elevated at 32.672 ng/L (reference value 0.004 ng/L). TLC count was 12×10^9 (reference value $4\text{--}10 \times 10^9$).

Patient management and follow up

Considering the symptoms of chest pain with ECG showing ST elevation, a diagnosis of acute coronary syndrome (ACS) was strongly suspected. Dual antiplatelet therapy with aspirin and clopidogrel was administered along with intravenous heparin. Urgent coronary angiogram revealed mild in-stent restenosis of the LAD stent (installed previously) with mild non-obstructive disease in the left circumflex and right coronary arteries (Figures 2, 3). A left ventriculogram showed apical ballooning of the left ventricle with preserved function of the basal segments (Figure 4). Transthoracic echocardiography revealed diffuse akinetic segments with only basal segments contracting normally and an estimated LVEF of 20%. Wall motion abnormalities were not limited to a single artery distribution.

Based on the clinical presentation of chest pain with diffuse ST-elevation on ECG, elevated cardiac enzymes, angiogram showing no acute obstruction of arteries, and ventriculography revealing apical ballooning, a diagnosis of TTS was made.

The patient was transferred to the Coronary Care Unit (CCU) and medical treatment was initiated with beta-blockers, angiotensin converting enzyme inhibitors (ACE-I) and mineralocorticoid receptor antagonists (MRA). After 2 days the patient continued to improve clinically and was discharged from the CCU.

Later, the patient was discharged on medical treatment and followed up in clinics. He currently remains asymptomatic and his LVEF returned to normal (60%) on repeat cardiac echo after 6 months.

Review of literature

TTS resembles acute coronary syndrome clinically. However, there is an absence of obstructive coronary artery disease with characteristic transient apical and mid-ventricular wall motion abnormalities [1]. Typically, the patient presents with chest pain and dyspnoea, with ECG changes mimicking ACS. Angiography, in most patients shows mild, non-obstructive coronary lesions (<50% luminal diameter stenosis) [1,2]. Although, the prognosis is generally favourable, with an almost complete recovery seen in 96% of patients [1,5,6], there is still a risk of complications including cardiogenic shock (15–20%), pulmonary oedema (20%), ventricular tachycardia (4%) and death (1–2%) [4,6]. The precise aetiology and pathophysiology of this syndrome remains unknown [1]. Possible pathophysiological mechanisms include multivessel epicardial coronary artery spasm, coronary microvascular impairment, catecholamine cardiotoxicity and neurogenic stunned myocardium [2,9,12]. Wittstein et al. observed that serum catecholamines concentration was significantly increased (2–3 times) in patients with TTS compared to patients with myocardial infarction [13]. Lyon et al. hypothesised that the cardiomyopathy noted here is a form of myocardial stunning, which has a different molecular mechanism, unlike the type seen during transient ischaemic episodes secondary to acute occlusion of a coronary artery. Higher levels of catecholamines induces B2-coupling from Gs to Gi, ultimately decreasing the contractile function of myocardium. The apex of the heart having higher adrenoreceptor density is affected more than the base [9].

There has been a debate on the criteria for diagnosis of TTS. Recently the International Expert Consensus Document on Takotsubo Syndrome was published, which has brought clarity to the subject. Our patient had persistent ST-elevation with transient apical wall akinesis, which was not explained coronary stenosis on

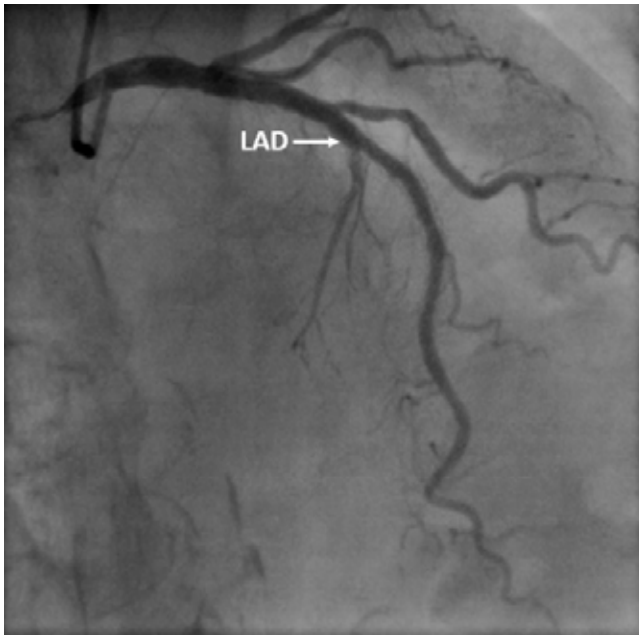


Figure 2. Cranial projection of coronary angiogram showing mild in-stent restenosis in prior LAD stent with mild non obstructive disease in the left circumflex artery

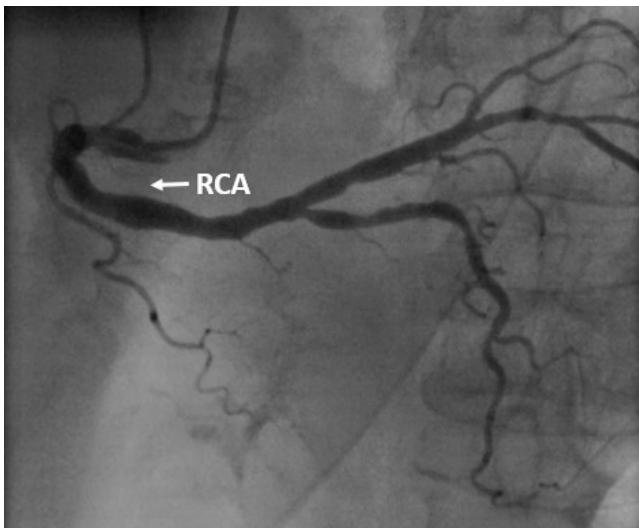


Figure 3. Left anterior oblique projection of coronary angiogram showing non obstructive disease in the right coronary artery

the angiogram, in the setting of a stressor qualified our patient as a classic case of TTS [14].

Cardiac involvement in dengue virus infection is seen in almost 10–15% of cases and myocarditis, pericarditis, arrhythmia and heart failure are potential complications [11,12,13]. In a study of 81 patients with dengue virus infection, cardiac involvement was observed in 15% of patients requiring hospitalisation, with clinical manifestation ranging from mild elevation of cardiac biomarkers to myocarditis and/or pericarditis, heart failure and death [11]. Although myocarditis and other cardiac complications are seen with dengue fever infection, TTS is an extremely rare complication of which only two cases have been reported in literature [7,8]. The first

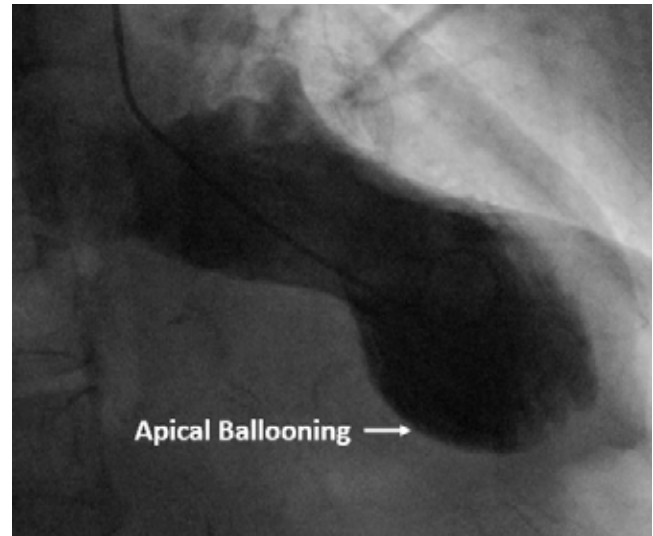


Figure 4. Left ventriculogram right oblique projection showing apical ballooning of left ventricle with hyper-contractile basal segments

case was reported in India of an 11-year old boy admitted for dengue fever who developed TTS during the course of his admission. ECG showed prolonged QT interval and symmetrical T wave inversion in all leads, and echocardiography confirming apical ballooning of the left ventricle [3]. The second case was reported in Taiwan of a 72-year-old woman who presented with symptoms of syncope and general malaise, later confirmed as dengue fever infection. Workup showed thrombocytopenia, prolonged QT interval, mildly elevated cardiac enzymes, and left ventricular apical wall motion abnormality. There was no significant coronary artery disease seen on angiography with ventriculography revealing apical ballooning [6]. However, cardiac magnetic resonance could be valuable to exclude infectious myocarditis. Due to cost constraints, CMR was not performed. In our case, the patient presented with diarrhoea, fever and general malaise which was later confirmed as dengue fever on serology. The patient then developed chest pain, and dyspnoea which was diagnosed as ST-elevation ACS based on ECG, which showed ST-elevation in the anterolateral leads (V2-V6). Coronary angiography confirmed non-obstructive coronary artery disease, while ventriculography showed apical ballooning, TTS was diagnosed.

Due to the clinical resemblance of ST-segment elevation myocardial infarction (STEMI) with TTS, the majority of patients are treated and diagnosed as STEMI. It is crucial that non-obstructed coronary arteries and other characteristic clinical features are uncovered as soon as possible, which allows aggressive resuscitation and prevention of unnecessary antithrombotic therapy, the latter of which could result in LV wall rupture. [9]. As cardiac function is normalised in most patients within a few weeks, there is no consensus on pharmacologic treatment of the LV failure seen in these patients [6,13]. In another study of TTS patients, cardiac dysfunction nearly normalised in subjects without any treatment, suggesting that the role of pharmaceutical treatment is supportive in the acute setting [6].

Standard supportive care with diuretics and vasodilators appears to be reasonable in this group of patients. Beta-agonists should gen-

erally be avoided, and mechanical support appears to be preferable in patients with hemodynamic instability [1]. Arrhythmia resulting from QT prolongation is commonly observed in patients with TTS, however, antiarrhythmics are not recommended prophylactically [5]. If shock occurs, an intra-aortic balloon pump is inserted as additional support for the circulation [6,13]. Upright posture, oxygen, and diuretics for pulmonary edema are reasonable to treat pulmonary oedema [13]. In our case, the patient responded well to diuretics and beta-blockers.

Conclusion

Dengue viral infection has various cardiac presentations, while dealing with such patients, clinician should consider the wide variety of cardiac injuries inflicted by the infection. Though rare, TTS is a differential which should be suspected in cases of sudden onset of dyspnoea and ST-segment elevation on ECG. The pattern of presentation in the available, but scarce case reports, including our own, is typical of TTS. Features include, apical ballooning, basal segment sparing, recovery of LV function over time to normal and reversion of wall motion abnormalities on follow-up.

Supplementary material

Video: Left ventriculogram right oblique projection showing apical ballooning of left ventricle with hyper-contractile basal segments

References

- Gianni M, Dentali F, Grandi AM, et al. Apical ballooning syndrome or takotsubo cardiomyopathy: a systematic review. *Eur Heart J* 2006; 27(13):1523–1529.
- Templin C, Ghadri JR, Diekmann J, et al. Clinical features and outcomes of Takotsubo (stress) cardiomyopathy. *N Engl J Med* 2015; 373(10): 929–938.
- Sharkey SW, Maron BJ. Epidemiology and clinical profile of Takotsubo cardiomyopathy. *Circulation* 2014; 78(9): 2119–2128.
- Pilgrim TM, Wyss TR. Takotsubo cardiomyopathy or transient left ventricular apical ballooning syndrome: a systematic review. *Int J Cardiol* 2008; 124(3): 283–292.
- Akashi YJ, Goldstein DS, Barbaro G, et al. Takotsubo cardiomyopathy: a new form of acute, reversible heart failure. *Circulation* 2008;118(25): 2754–2762.
- De Giorgi A, Fabbian F, Pala M, et al. Takotsubo cardiomyopathy and acute infectious diseases: a mini-review of case reports. *Angiology* 2015; 66(3): 257–261.
- Badve SV, Patil S, Rathod NM, et al. Dengue fever and takotsubo cardiomyopathy. *J Assoc Physicians India* 2015; 63(7): 67–70.
- Chou MT, Yu WL. Takotsubo cardiomyopathy in a patient with dengue fever. *J Formos Med Assoc* 2016; 115(9): 818–819.
- Lyon AR, Rees PS, Prasad S, et al. Stress (Takotsubo) cardiomyopathy—a novel pathophysiological hypothesis to explain catecholamine-induced acute myocardial stunning. *Nat Rev Cardiol* 2008; 5(1): 22.
- Wittstein IS, Thiemann DR, Lima JA, et al Neurohumoral features of myocardial stunning due to sudden emotional stress. *N Engl J Med* 2005; 352(6): 539–548.
- Miranda CH, Borges MD, Matsuno AK, et al. Evaluation of cardiac involvement during dengue viral infection. *Clin Infect Dis* 2013; 57(6): 812–819.
- Salgado DM, Panqueba CA, Castro D, et al. Myocarditis in children affected by dengue hemorrhagic fever in a teaching hospital in Colombia. *Revista de Salud Pública* 2009; 11(4): 591–600.
- Wali JP, Biswas A, Chandra S, et al. Cardiac involvement in dengue haemorrhagic fever. *Int J Cardiol* 1998; 64(1): 31–36.
- Ghadri JR, Wittstein IS, Prasad A, et al. International Expert Consensus Document on Takotsubo Syndrome (Part I): Clinical Characteristics, Diagnostic Criteria, and Pathophysiology. *Eur Heart J* 2018; 39(22): 2032–2046.