

Takotsubo Cardiomyopathy in a Patient with Neuroparalytic Snake Bite: A Case Report

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Running Title: Takotsubo cardiomyopathy

Abstract: *Introduction:* Takotsubo cardiomyopathy mimics acute coronary syndrome and is accompanied by reversible left ventricular apical ballooning in the absence of angiographically significant coronary artery stenosis. It is more commonly occurs in female patient. Stress is the main factor in takotsubo cardiomyopathy, with more than 85% of cases set in motion by either a physically or emotionally stressful event that prefaces the start of symptoms. *Case:* A case of 27 year old female who came with history of snakebite and she developed neuroparalytic symptoms including all four limb weakness, ptosis and respiratory muscle paralysis, for that she was given anti snake venom and mechanical ventilation support. she was also hemodynamically unstable and having ECG changes for that 2D - Echo was urgently done and shows stress induced cardiomyopathy. She was successfully managed with inotropic support, supportive measure and continuous cardiac monitoring. Snakebite induced neurotoxicity should be taken into account as a stress for cardiomyopathy.

Keywords: Takotsubo cardiomyopathy, Snake bite, Emotional stress, Apical ballooning, Ptosis, Antisnake venom

1. Introduction

The apical ballooning syndrome, or acute stress - induced cardiomyopathy, occurs typically in older women after sudden intense emotional or physical stress. The ventricle shows global ventricular dilation with basal contraction, forming the shape of the narrow - necked jar (takotsubo) used in Japan to trap octopuses. [1] The term takotsubo (tako = octopus, tsubo = a pot) was introduced by Sato and Dote in 1990 and 1991 to describe the left ventricular silhouette during systole in five patients presenting with clinical features of myocardial infarction but without obstructive coronary artery disease. [2]

Epidemiology

Takotsubo syndrome represents about 2% of all patients (and 5–6% of all female patients) who are initially diagnosed with acute coronary syndrome (ACS). It accounts for 0.02% of all hospitalizations in the US. About 90% of TC patients are women, whose mean age is about 68 years, and 80% of whom are older than 50 years. About 2.2% of TC cases had the reversed (basal) variant. Recurrence rate of TC is about 1.8% per - patient year. [3]

Clinical Profile

The typical presentation of Takotsubo cardiomyopathy is chest pain with or without shortness of breath, pulmonary oedema, hypotension and associated electrocardiogram (ECG) changes mimicking a myocardial infarction of the anterior wall. Chest pain was the predominant symptom in 76%, dyspnoea in 47%, and syncope in 7.7%. A preceding physical trigger occurred in 36% and an emotional trigger in 28%, and troponin values were elevated in 87%, with ST elevation shown on the ECG in almost half of the patients. While men can be affected, women are 10 - fold more likely

to show TC overall, and women older than 55 years are five times more likely to experience TC compared to those less than 55 years. [4]

Pathophysiology:

A complete explanation for the pathophysiology of TC remains elusive, but activation of the sympathetic nervous system appears central, with an identifying emotional or physiologic stimulus preceding onset in most cases. Multi - vessel epicardial coronary artery spasm has been postulated as the pathophysiologic pathway due to the generalized myocardial contractile abnormalities that do not follow a specific coronary artery territory, as observed in acute coronary obstruction in atherosclerotic disease. Abnormalities of coronary microcirculation have also been postulated. Familial clustering has only rarely been observed, and genetics, if at play, may be from common variants that facilitate adrenergic signalling or its downstream amplification. [5]

Stressors include the following:

- A death of a loved one
- Bad financial news
- Legal problems
- Natural disasters
- Motor vehicle collisions
- Exacerbation of a chronic medical illness
- Newly diagnosed, significant medical condition
- Surgery
- Intensive care unit stay
- Use of or withdrawal from illicit drugs

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International Takotsubo Diagnostic Criteria (InterTAK Diagnostic Criteria) ^[4]

- 1) Patients show transient left ventricular dysfunction (hypokinesia, akinesia, or dyskinesia) presenting as apical ballooning or midventricular, basal, or focal wall motion abnormalities. The regional wall motion abnormality usually extends beyond a single epicardial vascular distribution.
- 2) An emotional, physical, or combined trigger can precede the takotsubo syndrome event, but this is not obligatory.
- 3) Neurologic disorders (e. g., subarachnoid haemorrhage, stroke/transient ischemic attack, or seizures) as well as pheochromocytoma may serve as triggers for takotsubo syndrome.
- 4) New electrocardiogram (ECG) abnormalities are present (ST - segment elevation, ST - segment depression, T wave inversion, and QTc prolongation); however, rare cases exist without any ECG changes.
- 5) Levels of cardiac biomarkers (troponin and creatinine kinase) are moderately elevated in most cases; significant elevation of brain natriuretic peptide is common.
- 6) Significant coronary artery disease is not a contradiction in takotsubo syndrome.
- 7) Patients have no evidence of infectious myocarditis.
- 8) Postmenopausal women are predominantly affected.

2. Treatment

The treatment of takotsubo cardiomyopathy is generally supportive in nature. Treatment is dependent on whether patients experience heart failure or acute hypotension and shock. For patients in acute heart failure, ACE inhibitors, angiotensin receptor blockers, and beta blockers, are considered mainstays of heart failure treatment. For people with cardiogenic shock, medical treatment is based on whether a left ventricular outflow tract (LVOT) obstruction is present or Not. Therefore, early echocardiography is necessary to determine proper management. For those with obstructed LVOTs inotropic agents should not be used, but instead should be managed like patients with hypertrophic cardiomyopathy, (e. g. phenylephrine and fluid resuscitation) For cases in which the LVOT is not obstructed, inotropic therapy (e. g. dobutamine and dopamine) may be used, but with the consideration that takotsubo is caused by excess catecholamine. Furthermore, mechanical circulatory support with an intra - aortic balloon pump (IABP) is well - established as supportive treatment

Prognosis

The long - term prognosis is generally good, with the lowest mortality associated with episodes triggered by emotional rather than physical triggers. In - hospital complications and mortality are similar to acute myocardial infarction. Recurrences have been described in up to 10% of patients.

Differential Diagnosis

- 1) Acute Heart Failure
- 2) Acute Coronary Syndrome

3. Case Summary

A 27 - year - old female comes to emergency room with complain of bilateral lower limb weakness and numbness, difficulty in walking after few hours of alleged history of snakebite. On examination patient having 2 fang marks over left lower foot with erythema and swelling at local site. Patient presented with all four limbs Hypotonia, absent Planter reflexes, diminished deep tendon reflex and bilateral ptosis. In Primary examination Single breath count was 24. In vitals there was mild hypotension and tachycardia noted, with respiratory rate was 20 per minute and SpO₂ was 90 % on room air. Therefore, patient was diagnosed as neuroparalytic snake bite and admitted in ICU on Oxygen support. Initially 10 vials of lyophilised ASV reconstituted in 250 ml isotonic saline were given intravenously. Injection atropine 0.6 mg followed by Injection neostigmine 1.5 mg iv stat given. Repeated dosage of neostigmine dose 0.5 mg with atropine every 30 minutes for 5 doses given, in view of development of neuroparalytic symptoms. But Within an hour of admission patient developed respiratory arrest and for that patient was put on mechanical ventilation support and inotropic support were also started. Patient's ptosis was improved after 4 doses of atropine and neostigmine but in view of respiratory muscle paralysis repeated dose of 10 vials of ASV was given. From next day mechanical ventilation support gradually weaned off but patient is still having persistent tachycardia and severe hypotension instead of giving inotropic support. So, for these persistent Hemodynamically unstable conditions and in view of ECG changes and borderline elevation of Cardiac enzymes; 2Decho was done.

2Decho suggestive of Severe left ventricular dysfunction. Apical IVS, LV apex akinetic and apical ballooning, LVEF 30 - 35% which is suggestive of stress induced Takotsubo cardiomyopathy. Cardiologist opinion was taken for management and patient treated with inotropic support (Noradrenaline, dobutamine) with guarded fluid; without any need of anticoagulant and antiplatelet. After continues cardiac monitoring and efficient treatment patient was recovered after 7 days.

Laboratory Investigation

	Day - 1	Day - 3	Day - 5
Haemoglobin	13.4	13.3	12.9
Total leucocyte count	15430	12321	9768
Platelet count	328000	367000	321000
S. Creatinine	0.89		1.02
SGPT	65		
Sodium	138		134
Potassium	4.3		4.13
Trop - I	2.18	1.02	0.23
CPKMB	55	43	32
PT/ INR	15.7 / 1.30		13.1 / 0.98

BT (Bleeding Time) was 1 minute 22 second, CT (clotting time) was 3 minutes
Whole blood clotting time was normal.

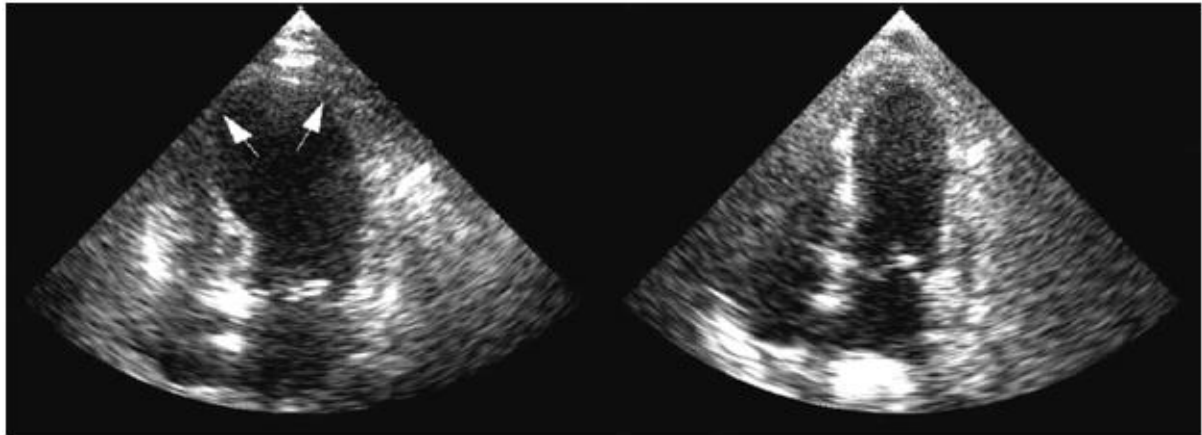
ECG: T inversion in lead I and aVL.

2Decho:

Severe left ventricular dysfunction. Apical IVS

LV apex akinetic and apical ballooning, LVEF 30 - 35%.

Rest normal findings.



4. Discussion and Conclusion

Takotsubo cardiomyopathy is new entity in disease spectrum with complex pathophysiology. It is one of the potentially reversible causes for heart Failure. So, when patients present with chest pain, Breathlessness along with the ECG changes and borderline elevated cardiac markers especially when stress factors present in old age females, that guide us to do high index suspicion for takotsubo cardiomyopathy; and it will save more expensive workups of patients. In literatures, there are very few cases reported on snakebite induce cardiomyopathy, hence, this case is worth reporting. Our case report will alert physicians for managing snake bite not only as a cardio inhibitory effect of snake venom but also it will put Takotsubo cardiomyopathy as a differential diagnosis.

Abbreviations:

ECG: Electro cardiograph

TC: Takotsubo cardiomyopathy

LVEF: Left ventricular ejection fraction

ASV: Anti snake venom

ACS: Acute Coronary Syndrome

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