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## Recurrent Takotsubo Cardiomyopathy: A Rare Diagnosis with a Common Emergency Department Presentation

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### Abstract

Takotsubo cardiomyopathy is a non-ischemic cardiomyopathy that is often triggered by a physical or emotional stressor and commonly affects post-menopausal women. A 57 year old female with a significant past medical history for atrial fibrillation, anxiety, and Takotsubo cardiomyopathy initially presented to the emergency department with onset of chest palpitations, sinus tachycardia, and non-specific ST-T wave changes on electrocardiogram following an argument. We present a case of recurrent Takotsubo cardiomyopathy, a rare clinical condition that can mimic other common cardiac symptoms, and is important to include on the differential diagnosis for early recognition and better management of potential acute adverse symptoms.

The incidence of recurrent Takotsubo cardiomyopathy after initial diagnosis is about 5% at 6 years with recurrence being more common when the initial episode has more severe left ventricular dysfunction [4]. While the long-term prognosis of Takotsubo is favorable in >95% of cases, acute symptoms of an episode can be life-threatening and lead to cardiogenic shock [5]. Proper diagnosis is crucial in these life-threatening situations. This is a case of a woman with recurrent Takotsubo cardiomyopathy presenting only with tachycardia and non-specific ST-T wave changes in the lateral leads on her ECG who went on to experience dramatic hemodynamic instability and cardiogenic shock. After an eventual hospital stay, she made a full recovery. Emergency medicine physicians need to have an awareness of recurrent Takotsubo cardiomyopathy as its presentation can mimic other common diagnoses such as acute coronary syndrome and pulmonary embolism, but management priorities are often different.

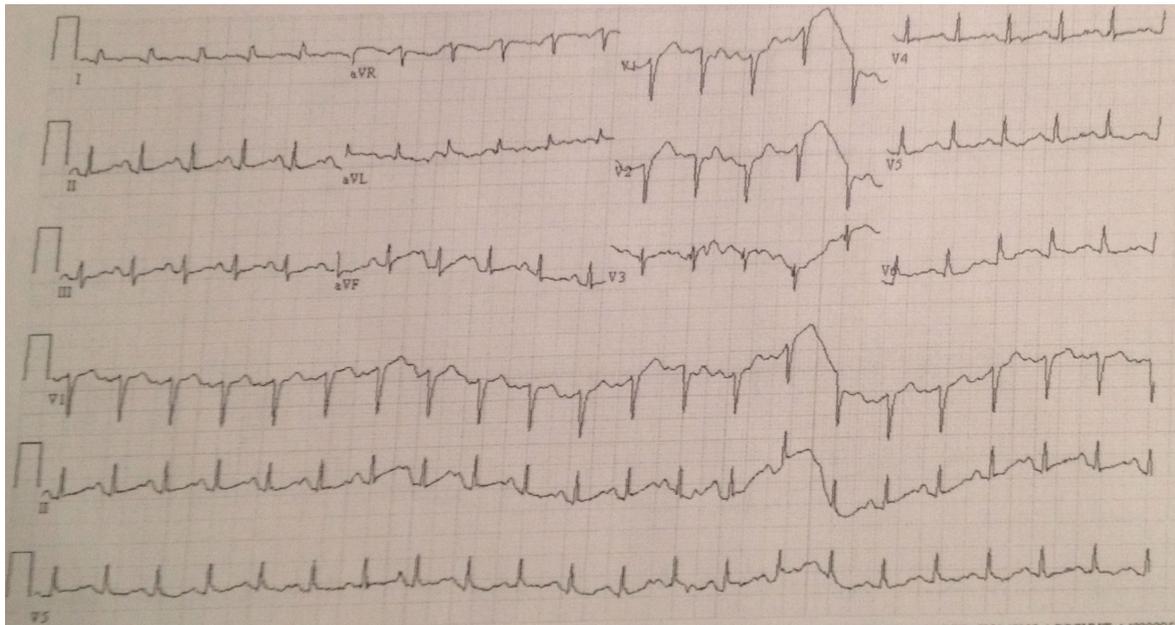
**Keywords:** Takotsubo cardiomyopathy; Cardiomyopathy; Anxiety chest pain

### Introduction

Takotsubo cardiomyopathy, a stress-induced cardiomyopathy also referred to as “broken heart syndrome,” is a non-ischemic cardiomyopathy that produces left ventricular dysfunction with characteristic left ventricular apical ballooning [1]. This most commonly affects post-menopausal women and is often precipitated by a physical or emotional stressor. The specific mechanism of Takotsubo is unknown but research suggests catecholamine excess and estrogen deficiency may be contributory. Excess levels of catecholamines and sympathetic hyperactivity, especially following a stressful event, are proposed to cause decreased myocyte contractility and apical akinesis due to a denser population of beta adrenoreceptors at the apex of the heart [2,3]. Post-menopausal women account for more than 90% of the cases, as such; estrogen is proposed to have a protective role against the toxic effects of catecholamines [4].

### Case Report

A 57-year-old female presented to a community emergency department (ED) with onset of chest palpitations after an argument. She described the palpitations as flutter-like with associated fatigue and chest tightness. Her past medical history was significant for atrial fibrillation status post ablation, anxiety, dyslipidemia, hypothyroidism, and an episode of Takotsubo cardiomyopathy 6 years prior to her presentation. Her most recent echocardiogram, 10 months prior, showed normal left ventricular function. Her medications included levothyroxine, venlafaxine, rosuvastatin and calcium plus vitamin D. Physical examination was significant only for tremulousness, tearfulness and sinus tachycardia. Initial vital signs showed heart rate=141, blood pressure=135/86 mmHg, respiratory rate=18/min, oxygen saturation=99% on room air, temperature=36.6°C (21:39). Initial electrocardiogram (ECG) showed sinus tachycardia rate of 128 with non-specific ST-T wave changes in the lateral leads and no ST elevation (**Figure 1**).



**Figure 1:** Electrocardiogram (ECG) at 21:43 demonstrating non-specific ST-T wave changes in the lateral leads and no ST elevations.

With pending laboratory results, a preliminary diagnosis of anxiety was made. Because the patient planned to drive herself home, no anxiolytics were administered; instead diltiazem 10 mg IV was administered to treat her tachycardia. When the patient was re-evaluated 10 minutes later she was hypotensive at 86/64 mmHg (22:23), and her blood pressure continued to decompensate to a systolic blood pressure (SBP) in the 60's (23:11). Normal saline fluid boluses were initiated (22:23), totaling 4 liters, and her SBP improved into the 80s (23:20). Throughout her course, the patient remained responsive.

Due to the concern for cardiogenic shock, cardiology was emergently consulted. Her labs revealed an elevated troponin of 2.49 ng/mL (normal 0.00-0.06 ng/mL) (22:50). Interventional cardiology was also consulted for concerns of an acute coronary syndrome. Dopamine was initiated and titrated to 15 mcg/min (23:06). Within minutes, the patient developed atrial fibrillation with rapid ventricular response with intermittent ventricular tachycardia (23:17). Amiodarone 100 mg IV bolus was administered and a drip of 1 mg/min was started in an attempt to stabilize the patient.

It is significant to note here that due to the nature of this ED, the time of day, and other factors, a bedside echocardiogram could not be performed until the interventional cardiologist arrived. Consequently, other potential diagnoses were ruled out first. Once the patient was relatively stable, a chest CT angiogram was performed which ruled out pulmonary embolism (23:57). The interventional cardiologist performed a bedside echocardiogram, which revealed apical wall akinesis which is a near pathognomonic finding of Takotsubo cardiomyopathy (00:11). The patient was then taken to the cardiac catheterization laboratory (00:15) where she was found to have patent coronary arteries. However, due to refractory hypotension, an intra-aortic balloon pump was placed and

remained for 48 hours. Over the next week, the patient's condition improved with supportive care and she recovered to be discharged to home.

## Discussion

This case is significant because it demonstrates a relatively rare clinical entity with common clinical cardiac symptoms. Upon initial presentation, the patient's vital signs were notable with a sinus tachycardia of 141. Considering her past medical history of atrial fibrillation, Takotsubo cardiomyopathy, and anxiety, it was particularly important to explain this abnormal vital sign. Caution was warranted in interpreting the sinus tachycardia as simply anxiety, in this case because of her significant additional past cardiac history.

The typical presentation of a patient with Takotsubo cardiomyopathy is new onset chest pain, dyspnea, or syncope with and without ECG changes, and at times progressing to cardiogenic shock and frequently following an emotionally or physically stressful episode [6]. Possible differential diagnoses for Takotsubo include anxiety, panic attack, acute coronary syndrome (ACS), pulmonary embolism, Prinzmetal's variant angina, dilated cardiomyopathy, cocaine cardiomyopathy, hypertrophic cardiomyopathy, coronary artery vasospasm, and esophageal pathology. When a diagnosis is not clear upon initial presentation, it is important to re-evaluate any abnormal vital sign and expand the work up to ensure a diagnosis is not missed.

Important aspects of the initial workup that can aid in diagnosing Takotsubo cardiomyopathy include ECG, troponins, echocardiogram, high clinical suspicion, key historical elements such as previous MI precipitated by a stressful event and/or prior diagnosis of non-ischemic cardiomyopathy, cardiac catheterization without coronary artery stenosis, and left

ventriculogram (**Table 1**). Since Takotsubo mimics other common diagnoses, on initial presentation patients may have had other episodes in the past. Upon review of this patient's

chart, she had two previous acute coronary episodes classified as non-ischemic cardiomyopathy in 2003 and 2005.

**Table 1:** Typical diagnostic findings in Takotsubo Cardiomyopathy [2,3].

Clinical or Diagnostic Test	Typical findings in Takotsubo Cardiomyopathy
Clinical evaluation (history and physical)	Key historical elements such as previous MI precipitated by a stressful event. Prior diagnosis of non-ischemic cardiomyopathy. High clinical suspicion.
Laboratory evaluation of cardiac markers: Troponin, Creatinine Kinase Myocardial Band (CK-MB), Beta Natriuretic Peptide (BNP)	May or may not be elevated
ECG (Electrocardiogram)	Changes can include non-specific ST and T wave changes and/or QTc prolongation
Echocardiogram	Typically reveals evidence of left ventricular (LV) akinesis with reduced LV ejection fraction.
Cardiac Angiography	No occlusive coronary artery disease.
Left Ventriculogram	Typically reveals evidence of LV akineses of apical and mid ventricular segments and hyperkinesis of base.

Distinguishing the diagnosis of Takotsubo cardiomyopathy from an acute coronary syndrome is important due to the differences in management. There are medications that offer potential benefit in patients to reduce the risk of recurrence such as angiotensin converting enzyme inhibitors and angiotensin receptor blockers [4]. Because episodes of Takotsubo often follow stressful events, these patients can also be counseled differently to learn stress coping and relaxation strategies [7]. Furthermore, the implications of misdiagnosing and mismanaging Takotsubo cardiomyopathy can be fatal. If a patient is treated with inotropes, it could result in worsened outcomes by causing immediate hemodynamic instability worsening the left ventricular outflow tract (LVOT) obstruction [8]. In this case, the administration of a diltiazem resulted in hypotension and the administration of dopamine resulted in atrial fibrillation with rapid ventricular response. Diligence in pharmacotherapy management is imperative.

Outcomes of Takotsubo cardiomyopathy are very promising as >95% completely recover. The severity of left ventricular dysfunction varies and some patients require intra-aortic balloon pump support, but many of these cases fully recover to a normal ejection fraction within a few weeks. Sequelae can include chronic intermittent chest pain and possible recurrence with arrhythmias occurring in ~2% and embolic events in 5% of patients; the post-hospital survival of these individuals does not differ significantly from the general population, most of their mortality is attributed to malignancy or non-cardiac conditions [5].

## Conclusion

This case is a presentation of a rare condition, recurrent Takotsubo cardiomyopathy. This is an important disease to include in a differential diagnosis in the emergency department because prompt diagnosis and appropriate treatment helps

avoid adverse outcomes. The cause of abnormal vitals such as tachycardia should be sought out and re-evaluated when a diagnosis has not been established. Emergency medicine physicians should have a higher suspicion of recurrent Takotsubo if there is history of a previous diagnosis of an acute coronary syndrome precipitated by a stressful event, cardiac catheterization without coronary artery stenosis, or a diagnosis of a non-ischemic cardiomyopathy.

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