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CASE REPORT

Atypical Takotsubo Cardiomyopathy Presentation in an Adult Patient

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Abstract

Takotsubo cardiomyopathy (TSC) is a transient cardiac condition brought on by physical and emotional distress causing left ventricular akinesis. Typically, patients are older females that present with substernal chest pain radiating to the left arm, presenting similarly to acute coronary syndrome. In addition, the elevated troponins and EKG changes such as ST elevations and T wave inversions seen in acute coronary syndrome may also be appreciated in TSC. While there have been many reports of TSC presenting in a similar manner to acute coronary syndrome, this case report will describe an atypical presentation of Takotsubo cardiomyopathy. The patient we are presenting is an African American middle-aged female who presented to the emergency department with a four-day history of non-bilious, non-bloody vomiting. Chief complaint denied any chest pain, shortness of breath, or recent physical and emotional stressors. Her past medical history was significant for Chronic Obstructive Pulmonary Disease Gold Criteria 2, controlled Hypertension, and Human Immunodeficiency Virus for which she is on antiretroviral therapy. Her hospital course was complicated by shortness of breath beginning on day two as well as elevated troponin levels and global T wave inversions on EKG. Patient underwent cardiac catheterization, which revealed left ventricular akinesis with an ejection fraction of <30%. Catherization also revealed no obstructive coronary artery disease, thus the diagnosis of Takotsubo cardiomyopathy was made.

Keywords: Takotsubo cardiomyopathy, Reversible cardiomyopathy, Stress cardiomyopathy, Left ventricular heart failure, Atypical takotsubo cardiomyopathy

1. Introduction

Takotsubo cardiomyopathy (TSC) is a reversible heart condition caused by increased sympathetic activity. Overtime, mental and physical stressors weaken the left ventricle, causing apical ballooning of the left ventricle.

TSC is often mistaken for Acute Coronary Syndrome (ACS) due to similar clinical presentation. The International Takotsubo Registry reports a prevalence of 1.2% of TSC cases presenting with positive troponin. ACS is a manifestation of coronary artery disease (CAD), most commonly caused by the process of atherosclerosis. According to American Heart Association, CAD is the leading cause of death in adults in the United States, accounting for 1/3 of all deaths in subjects over age 35 in 2016. 15.5 million people reported having CAD over the age of 20 years old in the United States in 2016.[1] Of this number, 2% incidence were subsequently diagnosed with TSC due to the absence of coronary artery obstruction.

There is a five-fold preponderance in women to men, with some studies showing an incidence of 10% TSC in women with CAD.[2] The most common presenting chief complaint of patients with TSC is both dyspnea and chest pain encompassing 64% of incidence.[3] Dyspnea alone occurs with an incidence of 24%. The chest pain alone is 16% of the time in the diagnosis of TSC.[3]

Patients with TSC typically present with dyspnea and/or angina-like symptoms without atherosclerotic arteries. Here we present an atypical presentation of TSC in which the patient presented initially with several days of gastrointestinal symptoms. She was found to have an abnormal EKG with elevated

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troponin, which lead to cardiac catheterization, confirming the diagnosis TSC.

2. Case

A 57-year-old African American woman with a past medical history of Chronic Obstructive Pulmonary Disease Gold Criteria 2, controlled Hypertension on hydrochlorothiazide, Human Immunodeficiency Virus on antiretroviral therapy with a CD4 count of 700 and viral load of 1,200, peptic ulcer disease, chronic back pain, and tobacco-use disorder presented to the emergency department with a four-day history of non-bilious, non-bloody vomiting, nausea and diarrhea. Over that time period she reported having 4–5 episodes of emesis that was accompanied by 3 watery non-bloody episodes of diarrhea. She denied any pain, fever, chills, SOB, chest pain, and urinary changes. She attributed the GI symptoms to "food poisoning". She took antacids with no relief, and reported staying hydrated by drinking water and sports drinks. Later, she remembered experiencing mild chest pain, which improved. She could not identify exacerbating or alleviating symptoms. Initial EKG in the emergency department demonstrated normal sinus rhythm with global T wave inversions. Repeat labs were significant for an initial troponin of 0.9 (normal values 0.0–0.04), elevated D-Dimer of 900 (normal values 220–500 ng/mL), proBNP of 8800 (normal values < 125 pg/mL). CTA was negative for pulmonary embolism. She was suspected to have NSTEMI secondary to stress from vomiting. She was cautiously started on heparin drip due to her history of GI bleed. On admission, the patient was hemodynamically stable. On day two of admission, the patient developed worsened shortness of breath and sharp, non-radiating, left sided chest pain under her sternum and left breast 8/10 in severity. She characterized the pain as a sharp pressure. No exacerbating or alleviating factors. She developed mild tachycardia HR 102; her vitals otherwise remained stable. The patient was uncomfortable, but without diaphoresis. Pain was not reproducible with palpation. She had normal S1 and S2 without murmurs, rubs, or gallops on cardiac auscultation and bilateral vesicular breath sounds. She had no peripheral leg edema. Urine toxicology was positive for fentanyl, methadone, and cannabinoids.

The patient had several risk factors for CAD that included hypertension, smoking tobacco, and HIV, however she was never previously diagnosed with CAD. The patient reported limited exercise capacity since the start of the COVID-19 pandemic, for the past six months. Prior to admission she had experienced mild fatigue and shortness of breath. The patient reports no other medical complications or illnesses recently. Due to the T wave changes on the EKG and mild troponin elevation, an echocardiogram was ordered. Echo revealed left ventricular ejection fraction of 25–35%, left ventricle apical hypokinesis and mild apical ballooning suggestive of distal left anterior descending branch occlusion. Coronary angiogram procedure was performed to identify occlusions or stenosis of arteries and was found to have left ventricular estimated ejection fraction of <30% with apical akinesis suggestive of TSC.

3. Discussion

Takotsubo cardiomyopathy (TSC) is a cardiac condition that resembles acute coronary syndrome however, in TSC the ventricular (LV) systolic dysfunction occurs in the absence of coronary artery stenosis or other causes. Other differential diagnoses that should be considered include vasospastic angina secondary to cocaine use, ST-elevation myocardial infarction, viral or idiopathic myocarditis, or pericarditis. While the pathophysiology underlying TSC is not well understood, postulated mechanisms include catecholamine excess, dysfunction of the microvasculature, and multivessel coronary artery spasm. The catecholamine excess from the stressors overtime causes reversible LV wall dysfunction.

Much of the evidence on TSC diagnosis and management was published by the International Takotsubo Registry (InterTAK). InterTAK consists of 26 centers in the United States and Europe and was established in order to better understand the clinical features, prognostic predictors and outcomes of TSC.[9] The registry collected data from 2011 through 2014 using the Mayo Clinic Diagnostic criteria for TSC.

Due to the increasing association of TSC with age, patients often have concomitant comorbidities that overlap with CAD.[1] In a prospective study by Schneider Et al. which consisted of 296 female patients and 28 male patients from 37 hospitals, the mean ages of females and males diagnosed with TSC were 68 ± 12 vs 66 ± 12 years, respectively. While this study found that TSC predominantly occurs in females, the 9% of males included in the study is comparable to the existing low prevalence of TSC in the general male population. A notable difference that is seen between each sex is the triggering event prior to the onset of TSC. Physical stress is the more common trigger for males while

emotional or no identifiable trigger was linked to TSC in females.[4]

While TSC most commonly occurs in post-menopausal women, TSC has also been observed in women under the age of 50 (5–11% of cases) and premenopausal women.[5] Dr. Sharkey et al. found 35% of the 136 consecutive TSC patients in a prospective cohort study had unique characteristics that differentiate them from the typical post-menopausal patient group found in TSC. These patients were either males, had a disease onset at an age less than 50 years old, a hospital death, recurrent nonfatal TSC events, had no identifiable inciting event, or had delay in the ejection fraction normalizing.[6]

Typically, patients with stress induced cardiomyopathy present with substernal chest pain, syncope, dyspnea and/or signs and symptoms of congestive heart disease. These patients typically have elevated troponins and ST elevations concerning for myocardial infarctions making ACS a likely cause.[1] In a prospective study by Dr. Park et al., 92 of the 3265 patients that presented with non-cardiac symptoms and did not have a history of cardiac pathology were found to have left ventricular apical ballooning on cardiac catheterization consistent with TSC.[7]

TSC is often indistinguishable from ACS on the basis of cardiac enzymes, ECG, and echo findings. According to the InterTAK study, anterior precordial lead ST elevations are the most frequent EKG finding. Other findings can include T wave inversion, QT prolongation, and abnormal Q waves.[8] Additionally, troponin and CK-MB levels are elevated with a median initial troponin 7.7 times the upper limit of normal, and CK-MB only mildly elevated.[9] proBNP being elevated. The mainstay for diagnosis is LV hypokinesis. Cardiac catheterization in patients with TSC reveals hypokinesis of the LV wall in 81.7% of cases.[10] The LV wall has systolic apical ballooning resulting in LV systolic dysfunction with a mean ejection fraction of 41%.[10]

Although TSC is a reversible form of heart failure, the long-term consequences of the disease can be severe. In the retrospective study collected from InterTAK involving 1750 patients, death rate from any cause is 5.6% per patient-year.[9] Additionally, the rate of major adverse cardiac and cerebrovascular events is 9.9% per patient year. The rate of recurrence of TSC was 1.8% per patient years with a span of 25 day up to 9.2 years after the first event. While the disease is more common in women, men had increased rates of death when compared to women (12.9% vs 5.0% per patient year, $p < 0.001$).[9] In a large cohort study by Sharkey et al. involving 136 patients, 85% of patients survived over the follow up period for 2.9 ± 2 years. Of the 15% of patients that died after discharge (age 51–92 years) the causes were noncardiac and most commonly due to cancer.[6] 1750 patients from the Takotsubo Registry were analyzed in a study by Templin et al. and compared to age and sex matched patients with ACS. The study found that TSC is associated with an increased risk for adverse events and females are more predominantly affected than males.[9]

In 2004 the Mayo Clinic developed a criterion for the diagnosis of Takotsubo cardiomyopathy that was later modified in 2008.[5] A concise criterion of the disease has been needed to properly distinguish these patients from other differential diagnoses such as ACS, myocarditis, and pheochromocytoma. With the criteria, TSC is becoming more recognizable. Ideally the criteria are to be used on admission. Each of the criteria must be met in order to diagnose TSC and as we learn more about the disease the criteria will be modified.[5]

Mayo Clinic Criterion for the Diagnosis of Takotsubo Cardiomyopathy:

1. Transient hypokinesis, akinesis or dyskinesia of the left ventricular mid-segments with or without apical involvement the regional wall motion abnormalities extend beyond a single epicardial vascular distribution; a stressful trigger is often, but not always present.
2. Absence of obstructive coronary disease or angiographic evidence of acute plaque rupture.
3. New electrocardiographic abnormalities (either ST-segment elevation and/or T wave inversion) or modest elevation in cardiac troponin.
4. Absence of: Pheochromocytoma and Myocarditis.

Physical triggers are more common than emotional triggers however a triggering event does not necessarily exclude the diagnosis of TSC. Greater than 50% of patients had an acute, former or chronic neurologic or psychiatric disorder.[9]

Cardiac histopathologic findings of patients who have died from sudden deaths during epilepsy or subarachnoid hemorrhages resembled patients who died from TSC. The study also confirms troponin levels and EKG changes are not sufficient to differentiate between CAD and TSC, therefore coronary angiography is necessary to differentiate between the two conditions. The presence of CAD is not an exclusion criterion for diagnosing TSC.[9]

While TSC does not involve stenosis of the affected area, concurrent CAD is a common finding in non-dysfunctional areas of the heart.[11] Of the 450

patients in a multicenter prospective study conducted by Parodi et al. 9.6% of patients had at least one relevant (>50%) coronary stenosis not supplying the dysfunctional myocardium and 90.4% of patients had irrelevant stenosis or angiographically normal coronary arteries.[11] The patients that had relevant stenosis generally were older in age, diabetic, had family history of CAD and had acute mitral regurgitations.[11]

TSC is a transient cardiomyopathy, therefore, long term treatment is not necessary. Removing the inciting stressor can improve cardiac wall motion.[12] Pharmacological management can include beta blockers, ACE inhibitors and diuretics to improve LV systolic dysfunction.[13] Medication combinations are similar to that in heart failure with reduced ejection fraction because of the similar LV dysfunction. However, as opposed to heart failure, stress induced cardiomyopathy has a good prognosis and typically patients can recover within weeks.[14]

The classic presentation of TSC has been taught as a devastating emotional stressor causing cardiac chest pain. More awareness and documentation of unexpected triggers and atypical symptoms is needed to better understand the disease. Our review of the literature revealed only a few other cases in which nausea and/or vomiting were a physical trigger for or a presenting feature of TSC.[6,15,16] It was unclear whether our patient's gastrointestinal symptoms were a cause or consequence of TSC, as she could not recall another emotional stressor. Perhaps the diversity of triggers leading to TSC is a testament to personalized nature of disease - the same emotional trigger or physical illness may seem benign to one individual and may cause overwhelming stress leading to cardiomyopathy in another individual. Likewise, the absence of identifiable stressor in a large proportion of cases may suggest that many patients often have hidden stressors in their lives of which they are unaware, yet can cause serious health consequences.

During the hospitalization, our patient could not identify the causal stressor in her life that could have caused the TSC diagnosis. However, after discharge, she worked closely with a psychiatrist to reveal any significant work and personal life stressors that she may be facing. During follow up, she reported improvement to her level of stress. She reports feeling better and losing a healthy amount of weight through exercise and dietary changes. She did not suffer any further episodes of shortness of breath or chest pain and follows up with her outpatient cardiologist regularly. She has taken the necessary steps to ensure success in her health. After arriving at the ED with gastrointestinal concerns and discovering TSC as a diagnosis, it was the motivational trigger that led her to remove the emotional or physical stressors from her life and focus on her overall health, mind and body.

Conflict of interest

The authors report no conflict of interest.

References

1. Kurowski V, Kaiser A, von Hof K, et al. Apical and midventricular transient left ventricular dysfunction syndrome (tako-tsubo cardiomyopathy): frequency, mechanisms, and prognosis. *Chest*. 2007;132(3):809–816. https://doi.org/10.1378/chest.07-0608. Epub 2007 Jun 15. PMID: 17573507.
2. Akashi YJ, Nef HM, Lyon AR. Epidemiology and pathophysiology of Takotsubo syndrome. *Nat Rev Cardiol*. 2015;12(7):387–397. https://doi.org/10.1038/nrcardio.2015.39. Epub 2015 Apr 7. PMID: 25855605.
3. Lloyd-Jones D, Adams RJ, Brown TM, et al. Executive summary: heart disease and stroke statistics–2010 update: a report from the American Heart Association. *Circulation*. 2010;121:948–954. https://doi.org/10.1161/CIRCULATIONAHA.109.192666.
4. Schneider B, Athanasiadis A, Stollberger C, Ellen Wegner C, Sechtem U. Gender differences in the manifestation of takotsubo cardiomyopathy [Internet]. *Int J Cardiol*. 2011;116(3):P584–P588 [cited 2020Nov7] https://www.internationaljournalofcardiology.com/article/S0167-5273(11)02084-5/fulltext.
5. Scantlebury DC, Prasad A. Diagnosis of takotsubo cardiomyopathy – Mayo Clinic criteria. *Circ J*. 2014;78(9):2129–2139. https://doi.org/10.1253/circj.CJ-14-0859.
6. Sharkey SW, Windenburg DC, Lesser JR, et al. Natural history and expansive clinical profile of stress (Tako-Tsubo) cardiomyopathy [internet]. Elsevier *J Am Coll Cardiol*. 2010;55(4):333–341 [cited 2020Nov8]. Available from: https://www.sciencedirect.com/science/article/pii/S0735109709036146?via=ihub.
7. Park JH, Kang SJ, Song JK, et al. Left ventricular apical ballooning due to severe physical stress in patients admitted to the medical ICU. *Chest*. 2005;128(1):296–302. https://doi.org/10.1378/chest.128.1.296. PMID: 16002949.
8. Parkkonen O, Allonen J, Vaara S, Viitasalo M, Nieminen MS, Sinisalo J. Differences in ST-elevation and T-wave amplitudes do not reliably differentiate takotsubo cardiomyopathy from acute anterior myocardial infarction. *J Electrocardiol*. 2014;47(5):692–699. https://doi.org/10.1016/j.jelectrocard.2014.06.006. Epub 2014 Jun 14. PMID: 25022798.
9. Templin C, Ghadri JR, Diekmann JL, Napp C. Clinical features and outcomes of takotsubo (stress) cardiomyopathy: NEJM [internet]. *N Engl J Med*. 2015;373:929–938 [cited 2020Nov8]. Available from: https://www.nejm.org/doi/full/10.1056/NEJMoa1406761.
10. Eitel I, von Knobelsdorff-Brenkenhoff F, Bernhardt P, et al. Clinical characteristics and cardiovascular magnetic resonance findings in stress (takotsubo) cardiomyopathy. *JAMA*. 2011;306(3):277–286. https://doi.org/10.1001/jama.2011.992. PMID: 21771988.
11. Parodi Guidoa, Citro Rodolfob, Bellandi Benedettaa, et al. *Bossone, Eduardocon behalf of the Tako-tsubo Italian Network (TIN) Tako-tsubo cardiomyopathy and coronary artery disease: a possible association*vol. 24. Coronary Artery Disease; 2013:527–533. https://doi.org/10.1097/MCA.0b013e3283645c4e. Issue 6.
12. Tsuchihashi K, Ueshima K, Uchida T, et al. Angina Pectoris-Myocardial Infarction Investigations in Japan. Transient left ventricular apical ballooning without coronary artery stenosis: a novel heart syndrome mimicking acute myocardial infarction. Angina Pectoris-Myocardial Infarction Investigations in Japan.

J Am Coll Cardiol. 2001;38(1):11–18. https://doi.org/10.1016/s0735-1097(01)01316-x. PMID: 11451258.

13. Bybee KA, Kara T, Prasad A, et al. Systematic review: transient left ventricular apical ballooning: a syndrome that mimics ST-segment elevation myocardial infarction. *Ann Intern Med*. 2004;141(11):858–865. https://doi.org/10.7326/0003-4819-141-11-200412070-00010. PMID: 15583228.
14. Sharkey SW, Lesser JR, Zenovich AG, et al. Acute and reversible cardiomyopathy provoked by stress in women from the United States. *Circulation*. 2005;111(4):472–479. https://doi.org/10.1161/01.CIR.0000153801.51470.EB. PMID: 15687136.
15. Akashi Yoshihiro, Musha Haruki, Kida Keisuke, et al. Reversible ventricular dysfunction takotsubo cardiomyopathy. *Eur J Heart Fail*. 2005;7(7):1171–1176.
16. Desmet WJR, Adriaenssens BFM, Dens JAY. Apical ballooning of the left ventricle: first series in white patients. *Heart*. 2003;89:1027–1031.