International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 07, Issue 07, July 2022,
https://doi.org/10.23958/ijirms/vol07-i07/1442

Case report

Broken Heart Syndrome; A Recurrent Presentation in a Teenager Female

Abdulrahman Eltayeb [1], MBBS, Hassan Ogran [2], MD, Abdalla Eltayeb *[2], MD,

[1]Resident, Ali Abdulfathah Hospital, Khartoum, Sudan
[2]Adult Cardiology Fellow, King Faisal Specialist Hospital & Research Centre KFSHRC, Riyadh, Saudi Arabia

*Corresponding Author: Abdalla Eltayeb; *abdullaheltayeb2002@gmail.com*

Received 24 June 2022; Accepted 06 July 2022; Published 09 July 2022

Abstract

Takotsubo syndrome (TTS) is a cause of heart failure with a wide range of clinical outcomes from mild to severe including, heart failure, arrhythmias and thromboembolic consequences. In its extreme forms, it can cause cardiogenic shock, strokes, and sudden cardiac death (SCD). This is a case report of a 21-year-old female with an unusual presentation of recurrent basal form of TTS (apical hyperkinesia with basal and mid segments akinesia), which was precipitated by recurrent painful crises of acute intermittent porphyria (AIP). AIP is an autosomal dominant disease resulting from a defect in porphobilinogen deaminase enzyme which is a part of the heme synthesis pathway. Acute attacks of AIP manifest mainly as episodes of abdominal pain, neuropathies and constipation. This case report highlights that TTS can occur in younger populations in contrast to what was classically described as the disease of post-menopausal women. It raises the awareness that TTS could be recurrent specially when there is proximity between the attacks.

Keywords: ***Recurrent takotsubo syndrome, Transthoracic Echocardiography, Global longitudinal strain, Acute intermittent porphyria, Premenopausal.***

Introduction

Takotsubo syndrome TTS is a cause of heart failure characterized by its transit course [1]. It has a wide range of clinical outcomes from mild to severe including heart failure, arrhythmias, thromboembolic consequences. In its extreme forms it can cause cardiogenic shock, strokes and SCD. It is currently well established that patients who have TTS are at risk of recurrence with a rate of 2-3% per year and up to 20% in one study [1,2]. Those patient at risk of TTS recurrence are usually females with low body mass index (BMI). Time interval from the first incidence is inversely proportional to the risk of recurrence, i.e., the shorter the period the higher the risk of recurrence [3]. Mid-ventricular obstruction explored by echocardiography in patients with TTS is implicated as a risk factor for recurrence of the disease [3].

Based on International Takotsubo Diagnostic Criteria (InterTAK Diagnostic Criteria), several components are needed for diagnosis of TTS which include characteristic regional wall motion abnormalities involving the apex mostly but can occur at the mid-ventricular level or the base of the heart, in addition to, electrocardiographic ECG changes and elevated cardiac troponin. The absence of significant coronary artery disease (CAD), which distinguishes TTS from acute coronary syndrome (ACS) is a major criterion for diagnosis of TTS. This syndrome usually has a triggering factor that could be physical or emotional. It is important to exclude mimickers such as myocarditis and ACS in the work-up of TTS [4].

In our case TTS was triggered by acute painful attack in a patient with acute intermittent porphyria (AIP) which is an unusual precipitant of the TTS. AIP is an autosomal dominant disease resulting from a defect in porphobilinogen deaminase enzyme which is a part of the heme synthesis pathway [5]. Acute attacks of AIP manifests mainly as episodes of abdominal pain, neuropathies and constipation. Management of AIP focuses mainly on two aspects. Firstly, supportive, and symptomatic management includes pain control, hemodynamics monitoring, nutritional support, and electrolytes correction. The second aspect is disease specific treatment which is mainly iron-containing porphyrin injections (Hemin), and dextrose infusion [5,6].

Case report

A 21-year-old female known case of (AIP) and seizure disorders - due to cortical dysplasia- presented to ER with a 2-day history of abdominal pain, bilateral lower leg and knee pain, recurrent nausea, vomiting, dark urine, and documented fever of 38◦ C. She was evaluated by the hematology team as an acute attack of AIP triggered by febrile illness, and was treated with vigorous IV hydration, pain control, and IV hemin. On day 2, she developed sinus tachycardia on the monitor, for which cardiac consultation was made. On assessment, she denied any chest pain, dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, palpitations, and fatigability. Blood pressure was recorded at 96/70 mmHg and heart rate was 113 bpm. She had bibasilar fine inspiratory crepitations but no jugular venous distention or lower limb edema. After conducting cardiology recommendations, she was found to have an increased high sensitivity troponin of 554 ng/L, pro-Brain natriuretic peptide of 9854 pg/ml, and sinus tachycardia of 138 bpm on electrocardiogram (ECG) with subtle ST elevation in V1-V3 and ST depression in inferolateral leads (**Figure 1**). Based on that, urgent transthoracic echocardiography (TTE) was conducted and showed severe left ventricular LV dysfunction with ejection fraction (LVEF)

of 20-30% and global longitudinal strain (GLS) of -11.7% along with moderately dilated LV. There was no left ventricular outflow tract (LVOT) obstruction. There was hypokinesis localized at the basal and mid segments, while the apex was hyperdynamic (basal form of TTS). The right ventricular (RV) systolic function was mildly reduced, and the RV apex was contracting better than the basal segments. There was no significant valvular lesions or pericardial effusion (**supplement 1**). Other blood results were unremarkable except for lactic acid of 7.12 mmol/L, indicating possible impending cardiogenic shock. Accordingly, she was transferred to the coronary care unit (CCU) for further management and hemodynamic monitoring. On the following five days, the patient responded well to cautious IV fluid without need for inotropic support, she was commenced on a small dose of Bisoprolol 1.25 mg daily, and Losartan 25mg daily. No major arrhythmic events were recorded during CCU admission. Thus, she was followed-up by the hematology team and continued to receive IV hemin and pain control till her acute porphyria attack subsided.

Upon further assessment, CT coronary excluded CAD (**supplement 4**). She had a cardiac magnetic resonance (CMR) done as a part of work-up to exclude myocarditis. The CMR showed normal LV size but mild to moderately reduced function of the left ventricle (LVEF 40%). There was no myopericardial thickening or pericardial effusion. However, fluid-sensitive sequences and late gadolinium enhancement was not completed as the patient refused to continue the exam (**supplement 2-3**).

Follow-up echocardiography done 3 weeks later revealed major improvement in overall LVEF 55% and RV systolic function and resolution of regional wall motion abnormalities (RWMA) which confirmed the diagnosis of TTS. The patient was advised to continue bisoprolol and losartan (**Figure 1**).

Three weeks later, she presented again to the ER complaining of epigastric pain, nausea, vomiting and chest pain for 2 days. She was found to be hypotensive with BP 50/33 and MAP of 45mmHg. Therefore, a central line was inserted and norepinephrine 0.1 mcg /kg/min, dopamine 5 mcg/kg/min and empirical antibiotics were started by the ER team. As a result of her recent cardiac diagnosis, the cardiology team was consulted again. A point of care echocardiography showed moderately decreased LV systolic function which was confirmed by a detailed TTE. It revealed, reduced LVEF 30-35%, GLS of average - 14.8 % and regional wall motion abnormalities similar to that in the first attack (Basal form of TTS). The right ventricle was normal in size and function. There was moderate to severe mitral regurgitation. However, doppler findings didn't suggest pulmonary hypertension or pericardial effusion. These findings raised the suspicion of recurrent TTS. Septic work-up including cultures, procalcitonin and C-reactive protein were negative. Given her presentation with shock, abdominal and lower limb pain, diagnoses of ischemic bowel and limbs were excluded by abdominal CT with contrast and doppler ultrasound to the lower extremities, respectively. She was managed with hemin, 100-mg IV daily for three days, pain management and cautious hydration for her AIP flare. After three days, her condition started to improve, and she was weaned-off inotropes. Her cardio-protective medications namely Losartan 25 mg, and bisoprolol 2.5 mg daily were resumed. She was observed and then discharged in a good clinical status. During follow-up visit she was doing fine and TTE showed resolution of RMWA and LV dysfunction LVEF 50-55% (**supplement 1-2**).

Table 1: International Takotsubo Diagnostic Criteria (InterTAK)

International Takotsubo Diagnostic Criteria (InterTAK)	
Left ventricular (LV) dysfunction	Transient apical, midventricular, basal or focal wall motion abnormalities +/-right ventricular (RV) involvement
Triggering factor	Emotional, physical or combined
Electrocardiogram (ECG)	ST segment elevation or depression, T-wave inversion, and QT prolongation
Cardiac markers	Elevated level of cardiac troponin, creatine kinase, and +/- brain natriuretic peptide (BNP)
Neurological disorders	Seizures, stroke, transient ischemic attack (TIA), subarachnoid hemorrhage
Differential diagnoses	Absence of coronary artery disease (CAD), and myocarditis
Epidemiology	Classically postmenopausal women

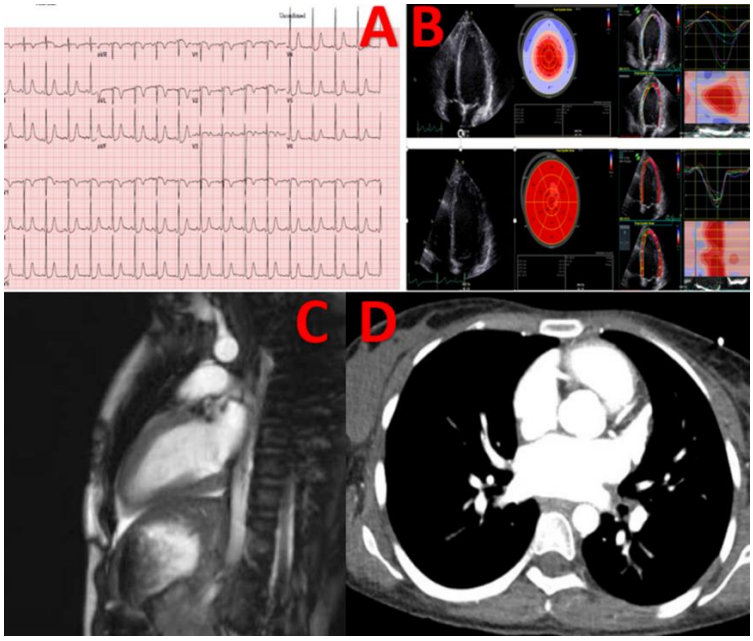

Figure 1: (A): ECG showed Sinus tachycardia and ST depression and T-wave abnormalities. (B) transthoracic echocardiography with strain pattern. The above row showed decrease LVEF and GLS of -11% with apical hyperkinesia, basal and mid segments akinesia. The lower row showed complete resolution and improvement of LVEF and GLS of -19.3% 3 weeks later. (C) cine image of MRI showed basal segment hypokinesia. (D) CT showed normal coronaries.

Discussion

Our case fulfilled InterTAK diagnostic criteria of TTS Table (1). In contrast to our patient, TTS affects mainly postmenopausal women. This fact supports the hypothesis of hormonal protective effect of estrogen during the pre-menopausal period. The diagnosis of TTS in our young patient could be explained by the fact that she could have hormonal irregularities, as she was amenorrheic for the last year prior to her presentation. However, hormonal levels were checked during work-up and did not suggest postmenopausal state FSH and LH levels were (1.7 IU/L, 4.8 IU/L), respectively. Given this strong association between decreased estrogen level and TTS incidence, however, no data support the use of estrogen replacement in the treatment of TTS currently [7]. Our case has multiple risk factors for recurrent TTS as female gender, low BMI (in our case was 16), RV involvement, and proximity between the TTS episodes (6-weeks interval in our case). One study reported recurrence within 22 days from the index episode [8]. Elderly females were at higher risk of recurrence of TTS with mean age of 65 years [9]. Nishida et al, described the association between biventricular involvement and TTS recurrence The exact pathophysiological mechanisms of TTS are not fully understood, but evidence suggest that sympathetic stimulation is central to its pathogenesis. Sympathetic stimulation could elevate norepinephrine levels in the coronary sinus found in some TTS patients. This local increase of catecholamines level in the heart could have a role as trigger factor for TTS. However, beta blocker was not found to decrease the risk of TTS recurrence **[10]**.

Conclusion

This 21-year-old female with unusual presentation of recurrent basal form of TTS (apical hyperkinesia with basal and mid segments akinesia) precipitated by recurrent painful crises of AIP. It highlighted that TTS can occur in younger population in contrast to what was classically described to be as the disease of post-menopausal women. Finally, it raised the awareness that TTS could be recurrent disease specially when there is a proximity between the attacks.

Ethical part

A written informed consent for publication was obtained from the patient. This case report is compliant with local institute and editorial polices. and the principles of the Declaration of Helsinki and was approved by the KFSHRC Ethics Committee.

Data Availability

Not Applicable.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Funding Statement

This case report received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Authors' contributions

AAE, wrote the case report, HO, organized the figures and tables, AA, reviewed the literature and finalized the manuscript.

References

[1] Ong GJ, Girolamo O, Stansborough J, Nguyen TH, Horowitz JD. Incidence and clinical/laboratory correlates of early hypotension in takotsubo syndrome. ESC Hear Fail. 2021;8(3):2009-15.

[2] El-Battrawy I, Santoro F, Stiermaier T, Möller C, Guastafierro F, Novo G, et al. Incidence and Clinical Impact of Recurrent Takotsubo Syndrome: Results from the GEIST Registry. J Am Heart Assoc. 2019;8(9):1-7.

[3] Yalta K, Yetkin E, Yalta T. Recurrent takotsubo cardiomyopathy: Further insights into morphological patterns. Cardiovasc Pathol. 2020;48(3):473-4.

[4] Ghadri JR, Wittstein IS, Prasad A, Sharkey S, Dote K, Akashi YJ, et al. International Expert Consensus Document on Takotsubo Syndrome (Part II): Diagnostic Workup, Outcome, and Management. Eur Heart J. 2018;39(22):2047-62.

[5] Deacon AC, Peters TJ. Identification of acute porphyria: Evaluation of a commercial screening test for urinary porphobilinogen. Ann Clin Biochem. 1998;35(6):726-32.

[6] Effective Management of Acute Porphyria: PATIENTS DESERVE ACCESS TO APPROPRIATE CARE Patients Diagnosed with Acute Porphyria Deserve Access to Treatment. :36. Available from: https://www.porphyriafoundation.org/apf/assets/File/public/patients/Patients-Deserve-Access-to-Appropriate-Care.pdf

[7] Ghadri JR, Wittstein IS, Prasad A, Sharkey S, Dote K, Akashi YJ, et al. International Expert Consensus Document on Takotsubo Syndrome (Part I): Clinical Characteristics, Diagnostic Criteria, and Pathophysiology. Eur Heart J. 2018;39(22):2032-46.

[8] Vriz O, Brosolo G, Martina S, Pertoldi F, Citro R, Mos L, et al. In-hospital and long-term mortality in Takotsubo cardiomyopathy: A community hospital experience. Vol. 6, Journal of Community Hospital Internal Medicine Perspectives. 2016.

[9] Singh K, Carson K, Usmani Z, Sawhney G, Shah R, Horowitz J. Systematic review and meta-analysis of incidence and correlates of recurrence of takotsubo cardiomyopathy. Int J Cardiol. 2014;174(3):696-701.

[10] Campos FAD, Ritt LEF, Costa JPS, Cruz CM, Feitosa-Filho GS, de Oliveira QB, et al. Factors associated with recurrence in takotsubo syndrome: A systematic review. Arq Bras Cardiol. 2020;114(3):477-83.