

Multimodal Imaging Approach for the Diagnosis of Focal Takotsubo Cardiomyopathy in a Postmenopausal Woman

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Abstract

Stress-induced cardiomyopathy (Takotsubo syndrome) is a condition characterized by temporary impairment of the left ventricular function that could present with features similar to acute coronary events or non-obstructive myocardial infarction (MINOCA). We present the case of a 72 years old female who had a past medical history of hypertension, type 2 diabetes mellitus and a cerebrovascular accident, who presented with an episode of intermittent, atypical angina. Her vitals were stable with a normal ECG but had elevated high-sensitivity troponin I levels at 656 ng/L. Echocardiography showed mid-anteroseptal hypokinesia, while a prior coronary CT angiography revealed an absence of coronary calcification with no coronary disease, and cardiac MRI demonstrated localized myocardial edema without late gadolinium enhancement, consistent with focal TCM. Symptoms resolved after treatment and left ventricular function normalized within the next six months. Upon further investigation, an emotional stressor was identified, which supports the diagnosis of TCM. This case highlights the importance of imaging, especially cardiac MRI, in differentiating focal TCM from other differential diagnoses, like myocarditis or acute coronary syndrome.

Keywords: Takotsubo cardiomyopathy; Non-obstructive myocardial infarction (MINOCA); Cardiac mri (cmr)

Introduction

Stress-induced cardiomyopathy (Takotsubo syndrome), commonly referred to as broken heart syndrome, is a rare condition affecting primarily elderly female patients. It is characterized by temporary impairment of the left ventricular function that could present with features similar to acute coronary events. The main differencing factor is the absence of significant obstruction in the coronary arteries. The condition was first described in Japan in 1990, and its name comes from the appearance of left ventricular anatomy on echocardiography, which resembles an ancient octopus' trap called a "takotsubo." Even though various types of TCM have been described in literature, the focal variant is one of the rarest, diffculting its diagnosis. This type of TCM can mimic other cardiac conditions such as myocarditis or myocardial infarction, making it difficult to distinguish in clinical practice [1].

Accurate diagnosis is crucial, as therapeutic options for TCM may differ substantially from those used to treat myocardial infarction or myocarditis. The use of advanced imaging techniques, such as advanced cardiac MRI techniques, has proven helpful in differentiating these conditions, especially in individuals with low risk of coronary artery disease [2]. The following clinical case illustrates the complexity of diagnosing the focal variant of TCM.

Case Presentation

A 72-year-old female with a past medical history of hypertension, type 2 diabetes, and a cerebrovascular accident presented to the emergency department with a two-week history of retrosternal chest pain. Her vital signs were: blood pressure of 110/70 mmHg, heart rate of 60 beats per minute, and an oxygen saturation of 97% on room air. No abnormalities were noted in the physical exam. Electrocardiogram (ECG) (Image A) showed T-wave inversions in the anterior leads (V2-V4) with no ST-segment elevation, a non-specific repolarization disorder and a low voltage QRS complex. High-sensitivity troponin levels were elevated at 656 ng/L. Her current medications included: metformin 500 mg twice daily, amlodipine 10 mg once daily, aspirin 81 mg once daily and atorvastatin 40 mg once nightly.

Echocardiography revealed regional impairment in myocardial contractility, initially raising suspicion for myocardial infarction or myocarditis. However, given that a coronary computed tomography angiography (CTA) performed five months earlier had ruled out coronary artery disease and showed a calcium score of 0 (Image B), the possibility of non-obstructive myocardial infarction (MINOCA) was considered more likely. Instead of proceeding with coronary angiography, advanced cardiac MRI techniques was performed, which revealed localized mid-anteroseptal myocardium edema without late gadolinium enhancement, highly indicative of stress-induced cardiomyopathy (Image C,D,E).

A follow-up echocardiogram performed six months later showed completely normal left ventricular function, confirming the diagnosis of TCM. Subsequently, an emotional trigger was identified as a potential precipitating factor, a common finding in TCM patients, as psychological factors are frequently associated for this condition [3].

Discussion

The focal variant of Takotsubo cardiomyopathy is a rare presentation of the disease, characterized by transient dysfunction of a specific region of the left ventricular anatomy. In most cases of TCM, it exhibits balloon-like dysfunction involving multiple walls, but the focal variant can mimic other conditions such as myocarditis or myocardial infarction, which also present with regional wall motion abnormalities [4]. This presentation pattern makes diagnosis particularly challenging.

Cardiac magnetic resonance imaging has gained popularity as an invaluable tool in the evaluation of TCM. Recent studies have demonstrated that CMR can identify key features such as myocardial wall edema without the late gadolinium enhancement typically seen in myocarditis, thus helping to differentiate TCM from other conditions [5]. In this patient, CMR showed localized myocardial edema in the mid-anteroseptal segment, with preserved signal intensity on late gadolinium enhancement sequences, which is a hallmark of Takotsubo cardiomyopathy. This pattern of reversible myocardial injury without fibrosis supports the diagnosis and helps rule out ischemic or inflammatory causes. For instance, a 2022 study described a similar case in which TCM presented with focal segmental dysfunction, and cardiac MRI was essential for an accurate diagnosis [6].

Although TCM remains an uncommon entity, its recognition is increasing, particularly in patients with marginal risk for coronary artery disease. A 2021 study on TCM in elderly patients noted that a high percentage of cases were initially diagnosed as myocarditis or myocardial infarction due to similarities in clinical and imaging findings [7]. This trend highlights the need for a meticulous diagnostic approach and the use of advanced technologies to avoid misdiagnosis.

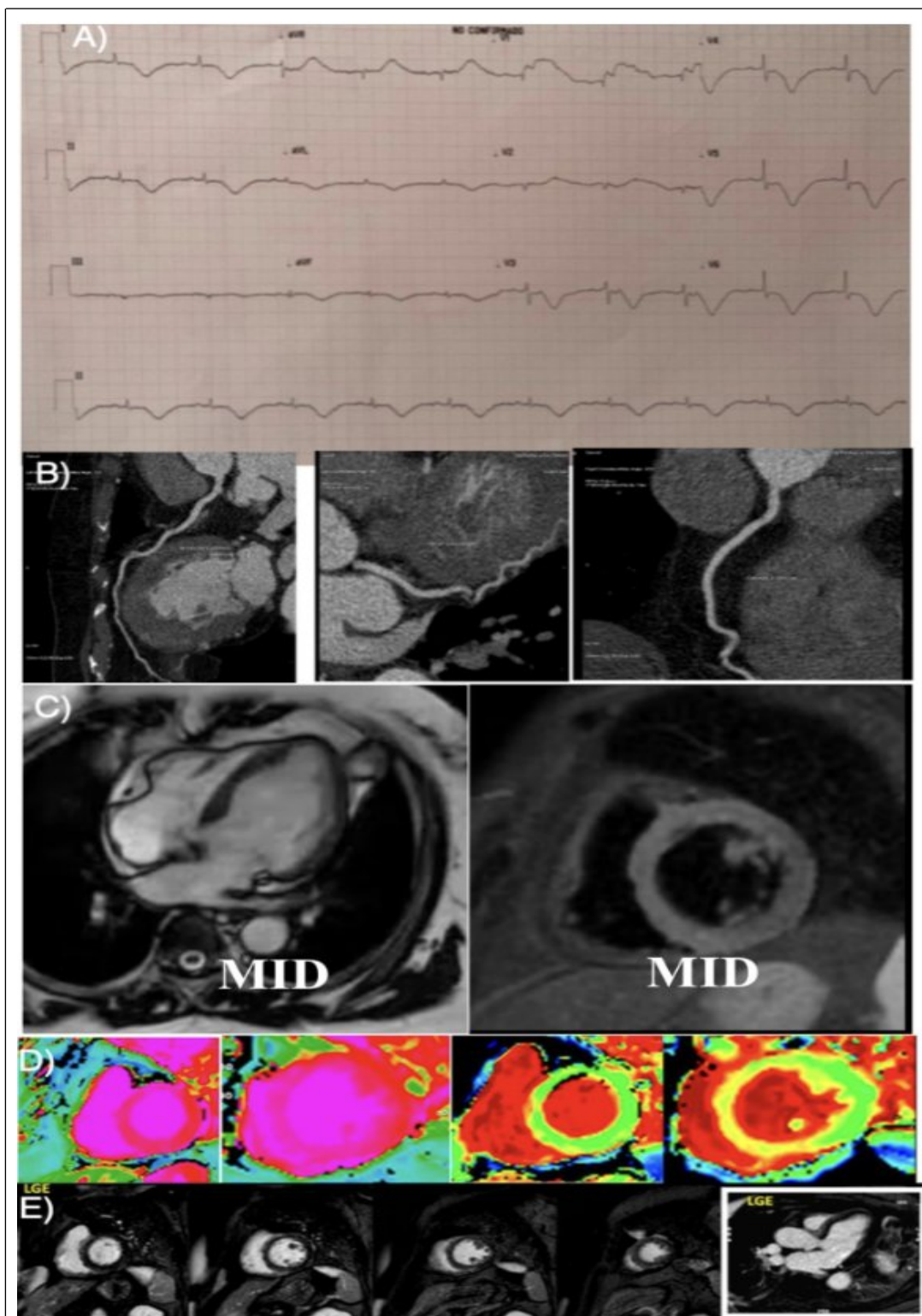


Figure: **Image A:** ECG: Negative T waves, nonspecific repolarization disorder and low QRS voltage. **Image B:** Coronary CT angiography: Coronary arteries without lesions, CAC score 0. **Image C:** CMR showing mid-segment interventricular septum hypokinesia (right) and localized edema on T2 weighted sequence (left). **Image D:** Native T1 map Evidence of increased native T1 in the interventricular septum. Extracellular Volume Map showing increased extracellular volume in the interventricular septum. **Image E:** Late gadolinium enhancement sequence with absence of late gadolinium enhancement.

Conclusions

Takotsubo cardiomyopathy, particularly its focal variant, remains a rare and complex entity that can be easily mistaken for other conditions such as myocarditis or myocardial infarction. Early and accurate diagnosis is essential to guide appropriate management, as therapeutic strategies differ significantly among these conditions. In this case, cardiac magnetic resonance imaging was crucial tool to aid in the definitive diagnosis of TCM, highlighting the importance of advanced imaging tools, even more in individuals with no or little risk factors for coronary artery disease. This case reinforces the idea that TCM should be considered in patients presenting with atypical clinical symptoms, particularly those without evidence of significant coronary obstruction. The identification of emotional triggers is a common feature in many TCM cases and may aid in the diagnostic process. As more cases are reported and research advances, the management of this condition is expected to evolve toward a more precise approach, guided by advanced imaging modalities such as CMR.

Conflicts of Interest: The authors declare no conflict of interest.

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