Case Report

Acute Appendicitis as an Unexpected Cause of Inverted Takotsubo Cardiomyopathy

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Abstract

Takotsubo cardiomyopathy (TTC), also known as transient left ventricular ballooning syndrome, is a stress-induced-cardiomyopathy. It is precipitated by emotional or physical stress and is characterized by normal coronary arteries and transient regional wall motion abnormalities. Variants of TTC include apical ballooning syndrome and, less commonly, mid, basal, and local variants. New onset heart failure or acute coronary syndromes are a common presentation of TTC. Arrhythmias such as VT, VF, and torsade de pointes have also been reported. We present here a 42-year-old man with an inverted Takotsubo variant with pulmonary edema and transient accelerated idioventricular rhythm. He was initially admitted in the Emergency Department for acute and non-complicated appendicitis. Coronary angiogram showed normal coronary arteries and left ventriculography revealed a reverse variant of TTC. The patient had completely recovered. Myocarditis was ruled out by cardiac magnetic resonance imaging.

Keywords: Appendicitis, idioventricular rhythm, takotsubo cardiomyopathy

Introduction

We present here the case of a 42-year-old man with an inverted Takotsubo variant (with pulmonary edema and transient accelerated idioventricular rhythm) who was initially admitted in the ED for an acute and non-complicated appendicitis.

Case Report

A 42-year-old Caucasian man with no previous medical history was admitted to the emergency department (ED) with a 6-h history of moderate lower abdominal pain and vomiting. He was not taking any medication; there was no history of illicit drug use and no vascular risk factors. The initial assessment showed an anxious patient with a pulse rate of 68 beats/min and a blood pressure (BP) of 138/76 mmHg, respiratory rate of 16 breaths/min and oxygen saturation of 98% on room air. Body temperature was slightly increased at 38.2°C. On first clinical examination in the ED, the abdomen was soft and nondistended with mild tenderness in the right lower quadrant. Bowel sounds were present. The rest of the physical examination was normal. An intravenous line was placed for analgesia, and blood tests were performed.

Fifteen minutes after his admission, the patient developed sudden chest pain radiating to his back, palpitations, and dyspnea. At the next evaluation, the patient was found to have tachycardia, tachypnea, and hypoxemia with massive hemoptysis. On auscultation, there were crackles in both lungs. Cardiac rhythm was regular without any murmur. The BP read 180/110 mmHg and was equal in both arms.

Chest X-ray revealed diffuse pulmonary edema. Electrocardiography showed an accelerated idioventricular rhythm (AIVR) [Figure 1]. The systolic BP descended to 70 mmHg. Initial troponin-I level was increased at 2.8 ng/ml (reference range: <0.04 ng/ml). The remainders of the blood tests were normal. A thoracic and abdominal contrast-computed tomography scan was performed immediately and revealed

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How to cite this article: Mihalcea-Danciu M, Zupan M, Le Borgne P, Bilbault P. Acute appendicitis as an unexpected cause of inverted takotsubo cardiomyopathy. J Emerg Trauma Shock 2018;11:143-5.

Received: 01.03.17. Accepted: 26.09.17.
normal aortic anatomy and signs of acute appendicitis without complications.

Due to progressive hypoxia and a persistent cardiovascular instability, the patient required intubation, and he was transferred to the Intensive Care Unit. A transthoracic echocardiogram showed hypokinesis of all basal and mid left ventricular (LV) segments with preserved function of the apical segments. Overall estimated ejection fraction was 30%.

The patient was surgically treated for his acute appendicitis. He was rapidly transferred to the cardiac catheterization unit for a coronary angiogram, which showed unremarkable coronary arteries without any signs of obstruction. Ventriculography revealed an inverted Takotsubo cardiomyopathy (TTC) with extensive basal and mid-ventricular akinesia and apical hyperkinesia [Figure 2]. The ejection fraction was 25%. An intra-aortic balloon pump was placed. Six hours later, the patient’s clinical status improved rapidly, and electrocardiogram (ECG) was normal. He was extubated 48 h later and transferred to the Cardiology Department. A repeat echocardiogram on day 4 showed an ejection fraction of 52% with a complete resolution of wall motion abnormalities. Laboratory evaluation for pheochromocytoma was negative.

The patient was discharged in a stable condition 10 days after admission from the ED. One month after admission, a cardiac MRI demonstrated complete normalization of ventricular function (ejection fraction at 74%) as well as normal wall motion and thickness and the absence of any late gadolinium enhancement.

**Discussion**

Inverted, or reverse, TTC (ITC), described for the first time in 2005 as a novel heart neurologic stress-related syndrome, is one pattern of stress-induced cardiomyopathy also known as transient LV ballooning syndrome. It is characterized by hypocontractility of basal and midventricular segments with hyperkinesia of the apex.[1]

The pathophysiological basis of this myocardial dysfunction is associated with coronary spasm, perfusion defects secondary to impaired microcirculation, or with the effects of catecholamines at toxic levels on myocardial receptors. The inverted type commonly presents at an early age compared with other types of TTC, pointing out that peak adrenoreceptor density is at the base of the heart during youth and gradually shifts towards the apex at an older age.[2]

This pattern is more often associated with either mental or physical stress in specific clinical conditions, including trauma.

Troponin release is higher in ITC compared to other patterns because of the larger muscle region involved in ITC compared to apex akinesia seen in typical TTC, but natriuretic peptides are more elevated in apical and midventricular hypocontractility. This is clinically translated by more severe symptoms and higher NYHA functional class.

In a recent systematic review, the most common ECG abnormalities observed in patients with TTC was ST-segment elevation (49%–91%), T wave inversion (44%–83%), and Q waves (27%–32%). Arrhythmias such as ventricular tachycardia, ventricular fibrillation, and torsade de pointes have also been reported.[3]

Our patient presented with transient AIVR soon after the onset of chest pain suggesting coronary reperfusion. AIVR is the most frequent arrhythmia occurring during the primary percutaneous coronary intervention in patients with ST-elevation myocardial infarction.[4] These patients showed more pronounced diastolic LV dysfunction before and after AIVR than patients without AIVR, which suggests that diastolic LV dysfunction contributes to the occurrence of AIVR and that AIVR is a sign of diastolic LV dysfunction.[4]

This is the first time that such an arrhythmia is described in an inverted Takotsubo pattern, which is extremely rare in male patients. Interestingly, the only identifiable preceding physical stressor was right lower abdominal pain before presentation, confirmed to be an acute appendicitis, and also the emotional stress following the announcement of surgical treatment. This
perioperative condition can be properly managed with adequate counseling or pharmacotherapy.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

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