

“Covidsubo”: Stress-Induced Cardiomyopathy by Novel Coronavirus Disease 2019

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Established Facts

- Coronavirus disease 2019 (COVID-19) is a rapidly spreading infection that has already affected more than 14 million people around the globe at the time of this report.
- The consequences of the COVID-19 pandemic on the individual, societal, national, and international level are multifaceted.

Novel Insights

- In addition to the direct effects of SARS-CoV-2 on human health, fear and anxiety about COVID-19 can be overwhelming and cause illness as well.
- In the present report we describe the development of stress cardiomyopathy in a patient who was overwhelmingly stressed by watching the news coverage of the COVID-19 pandemic.

Keywords

Stress cardiomyopathy · COVID-19 · SARS-CoV-2

Abstract

Introduction: COVID-19 is a rapidly growing infectious disease that represents an immediate threat for the health of millions of people around the world, both in direct and indirect ways. **Case Presentation:** In the present report we describe the development of stress cardiomyopathy in a patient who was overwhelmingly stressed by watching the news coverage of the COVID-19 pandemic. **Conclusion:** Phy-

sicians and scientists around the globe should be aware of the psychological consequences of COVID-19 and their potential to cause physical illness.

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Introduction

Coronavirus disease 2019 (COVID-19) is a rapidly spreading infection that has already affected 14 million people around the globe at the time of this report [1]. It manifests primarily as a respiratory illness which can

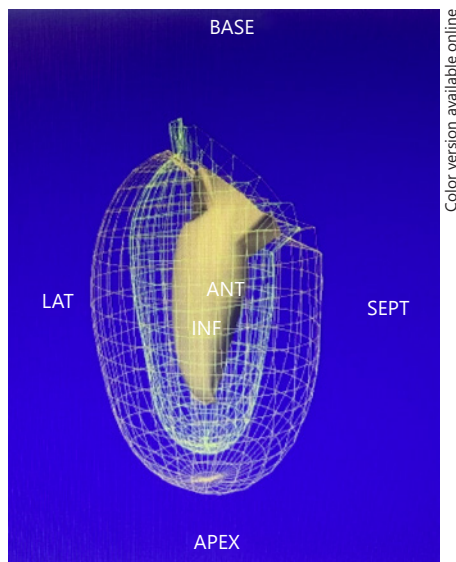


Fig. 1. Myocardial SPECT perfusion image showing normal left ventricular systolic function and normal apical wall motion 1 year prior to the current presentation.

progress rapidly to pneumonia and acute respiratory distress syndrome, although involvement of the cardiovascular system is also frequently reported [2, 3]. It is not only the direct effects of SARS-CoV-2 on human health, though, that make COVID-19 a devastating pandemic. Fear and anxiety about the disease can be overwhelming and cause illness as well.

Stress or Takotsubo cardiomyopathy is a clinical syndrome associated with acute onset of left ventricular systolic dysfunction in the setting of significant emotional or physical stress. In this report, we present a woman who developed stress cardiomyopathy as a result of closely following the news coverage of the COVID-19 pandemic.

Case Presentation

A 65-year-old Caucasian woman with no significant past medical history presented to the emergency room complaining of acute-onset, persistent chest discomfort with associated diaphoresis. Her symptoms started after she had finished gardening and while she was cooking dinner. She admitted doing these activities to provide her with stress relief from the concerning news coverage of the coronavirus, which she had been following very closely. She denied dyspnea or other symptoms. She has never used tobacco products or recreational substances. Prior evaluation of atypical chest complaints, different from the current presentation, had led to the performance of myocardial perfusion imaging with SPECT, which had been unremarkable a year ago (Fig. 1). Her electrocardiogram (ECG) at that point had been within normal limits.

Upon current evaluation in the emergency room, her blood pressure was 142/77 mm Hg, while the rest of her vital signs were unremarkable. Her initial ECG revealed a sinus rhythm at 63 beats/min, with marked T wave inversion in the inferior and anterolateral leads (Fig. 2). She was administered 325 mg of aspirin, 600 mg of clopidogrel, nitroglycerine, and enoxaparin. Her symptoms after initial care in the emergency room improved. Initial troponin I was found to be 0.98 ng/mL (reference range: 0.00–0.013 ng/mL), which subsequently increased further and peaked at 9.9 ng/mL. The rest of her laboratory tests was unremarkable. Follow-up ECGs were unchanged.

The patient underwent left heart catheterization the next day. A coronary angiogram showed TIMI 2 flow down the left anterior descending artery despite no significant coronary artery disease (Fig. 3). Her left ventriculogram showed basal hyperkinesis with dyskinesia of the apex suggestive of stress cardiomyopathy (online suppl. Video 1; for all suppl. material, see www.karger.com/doi/10.1159/000511450). Her left ventricular end-diastolic pressure was 21 mm Hg, and there was no significant gradient on pull-back of an end-hole catheter. The patient was asymptomatic and hemodynamically stable after the procedure. Her transthoracic echocardiogram also demonstrated left ventricular systolic dysfunction with apical ballooning and no hemodynamically significant valvular disease. The left ventricular ejection fraction was estimated in the range of 30%, via the biplane method of discs.

The patient reported that she had no recent deaths in the family or other typical stressors associated with stress cardiomyopathy. At that time, her husband raised his concern about how much attention she was paying to the news coverage of the COVID-19 pandemic. She was treated with metoprolol succinate, lisinopril, and spironolactone. The risk of left ventricular thrombus formation and subsequent systemic embolism, in the setting of stress-induced cardiomyopathy with severe left ventricular dysfunction and extensive apical ballooning, was discussed with the patient, who agreed to be treated with anticoagulants, as per the current expert recommendations [4]. Apixaban was selected over warfarin given her concerns of being exposed to COVID-19 during her laboratory visits for INR checks. Later that evening, she underwent urgent discharge, again due to concerns of contracting COVID-19 while in the hospital. She was encouraged to avoid watching the news and all social media concerning the coronavirus.

On her follow-up visit to the clinic, 6 weeks later, she reported feeling better after avoiding watching the news. She denied any bleeding episodes. Her electrocardiogram showed resolution of the T wave inversions (Fig. 4). Her echocardiogram demonstrated normalization of the left ventricular function, consistent with the natural disease course of stress cardiomyopathy (online suppl. Video 2). Anticoagulation treatment was discontinued at that point.

Discussion

In the present report we described the development of stress cardiomyopathy in a patient who was overwhelmingly stressed by watching the news coverage of the COVID-19 pandemic. Stress cardiomyopathy or Takotsubo syndrome is the development of left ventricular systolic

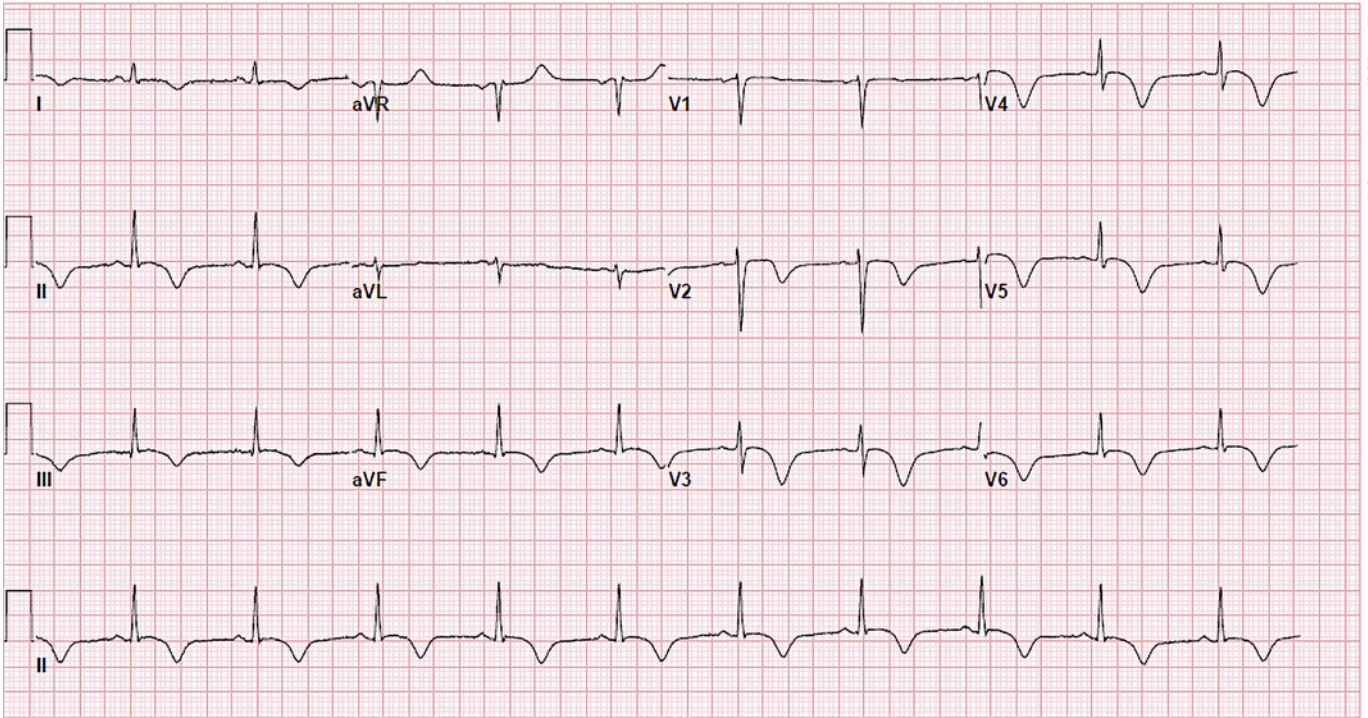


Fig. 2. Electrocardiogram of the 65-year-old Caucasian woman upon presentation to the emergency room complaining of chest discomfort.



Fig. 3. Selective coronary angiograms of the left and right coronary arteries of the 65-year-old woman in the setting of chest discomfort, electrocardiographic changes, and elevated cardiac enzymes.

dysfunction in the setting of a significant emotional or physical stressor [4, 5]. The presence of regional wall motion abnormalities that extend beyond the territory of one epicardial vessel can give clues to the diagnosis, which otherwise presents with chest discomfort, ECG changes, and cardiac enzyme elevation and can mimic myocardial

infarction [4]. Many times, a coronary angiogram is necessary to establish the diagnosis by excluding coronary artery disease [4]. The typical pattern of wall motion, which has been described as apical ballooning, includes a hypercontractile left ventricular base with hypo-/akinesis of the apex [5]. Our patient presented with all the typical

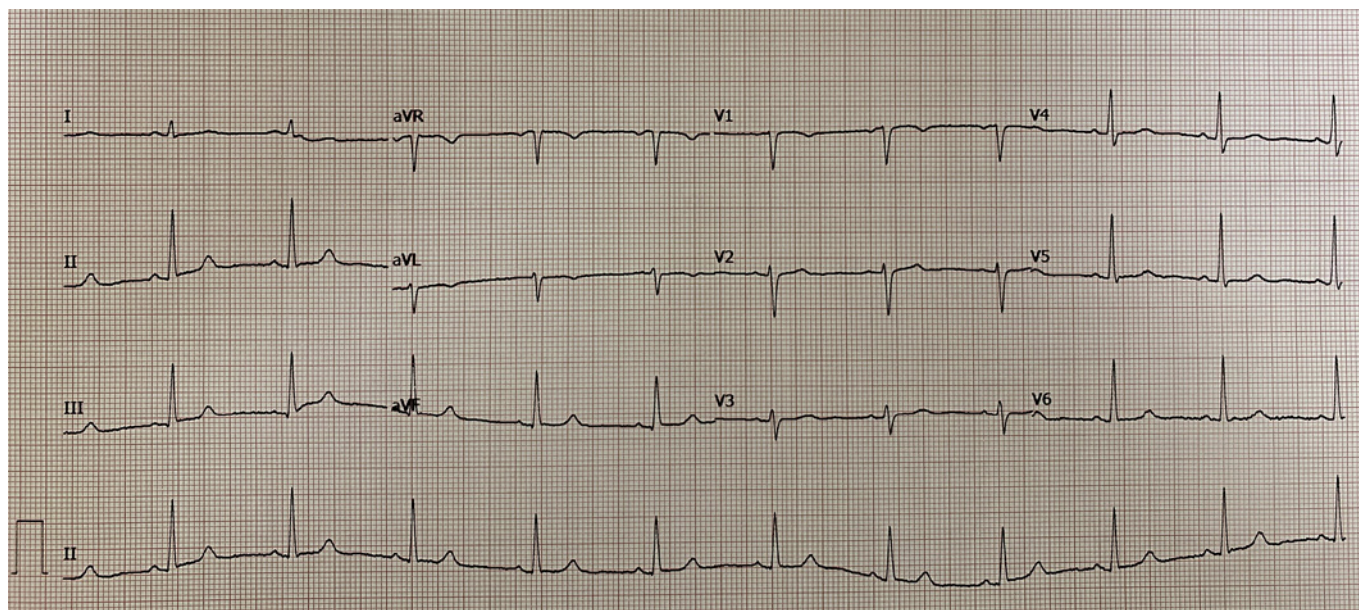


Fig. 4. Follow-up electrocardiogram of the 65-year-old Caucasian woman with stress-induced cardiomyopathy, showing resolution of the initial changes.

features of stress cardiomyopathy described above. Her acute onset of chest pain, T wave inversions on the ECG, and troponin I elevation initially resembled acute coronary syndrome. A coronary angiogram was necessary to demonstrate the absence of significant coronary artery disease. A typical pattern of left ventricular wall motion was noted on the left ventriculogram and echocardiogram, consistent with stress cardiomyopathy.

The exact pathogenetic mechanism of stress cardiomyopathy is not completely understood yet, but it has been proposed that microvascular dysfunction might be contributing [6]. This can explain the TIMI 2 flow that was seen on the coronary angiogram of our patient, as well as the improvement in her symptoms after the initial treatment with antiplatelet and antianginal agents. Impaired coronary flow in the setting of stress cardiomyopathy has been reported in the literature, further supporting the above hypothesis [6, 7].

Although left ventricular systolic dysfunction is transient in the majority of cases, and stress-induced cardiomyopathy was initially thought to be a benign condition, there is accumulating evidence supporting a high mortality rate, not very dissimilar to that of acute coronary syndromes [8]. Increased rates of serious complications like ventricular arrhythmias, systemic thromboembolism, and cardiogenic shock have been reported [8]. Thankfully, our patient had an uneventful recovery, with nor-

malization of her left ventricular systolic function 6 weeks after her original presentation. She was treated with a beta-blocker, an angiotensin-converting enzyme inhibitor, and an aldosterone receptor antagonist. Additionally, she was anticoagulated with a factor Xa inhibitor to prevent left ventricular thrombus formation in the setting of severe left ventricular dysfunction [4].

The most commonly reported causes of stress cardiomyopathy include loss of loved ones, natural disasters, significant financial loss, assault, and violence, with all of them resulting in a sense of doom, danger, or significant desperation [9]. This is consistent with our patient, who presented after feeling desperate and in danger from watching the news on the COVID-19 pandemic.

COVID-19 is a rapidly growing infectious disease that represents an immediate threat for the health of millions of people around the world, both in direct and indirect ways [10]. Physicians and scientists around the globe should be aware of the psychological consequences of COVID-19 and their potential to cause physical illness.

Statement of Ethics

Our patient has given written informed consent to publish her case (including publication of images).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors used their own resources.

Author Contributions

E.K. collected the patient's information and wrote the first draft of the report. S.B.M. obtained written informed consent from the patient and helped with collection of the patient's information and in manuscript drafting. T.T. and S.D. provided the angiographic images and assisted with the drafting of the report. All authors approved the report in its current form.

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