

CASE REPORT

BEGINNER

CLINICAL CASE

Takotsubo Cardiomyopathy Triggered by Emotional Stress From the Russia-Ukraine War



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ABSTRACT

Stress-induced cardiomyopathy presents like acute coronary syndrome and is triggered by emotional stress or critical illness. Increased incidence has been reported during the COVID-19 pandemic and natural disasters. We describe a case of stress-induced cardiomyopathy as an indirect consequence of the Russia-Ukraine war. **(Level of Difficulty: Beginner.)** (J Am Coll Cardiol Case Rep 2023;16:101895) © 2023 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

The devastating consequences of war on civilians and military are enormous. The negative impact can be financial, physical, or psychological and is often hard to quantify.¹ The Russia-Ukraine war started in February 2022 and is still far from de-escalating. Following the Crimean bridge explosion, multiple attacks on Ukrainian cities,

particularly Kyiv, intensified, striking several civilian targets.² Communication channels were disrupted, and it became almost impossible for families and friends worldwide to contact their loved ones living in the war-affected areas.

We report a case of a 59-year-old woman diagnosed with stress-induced cardiomyopathy (SIC) due to her inability to get in touch with her father in Kyiv, despite multiple attempts.

LEARNING OBJECTIVES

- To identify exposure to war-related experiences as one of the social determinants of health that can increase the risk of cardiovascular disease.
- To appreciate the far-reaching, indirect health consequences of war on individuals, irrespective of their proximity to the conflict.
- To employ the InterTAK (International Takotsubo Registry) tool in differentiating between SIC and ACS in patients presenting with acute chest pain, ensuring prompt and appropriate treatment.

HISTORY OF PRESENTATION

This 59-year-old Caucasian woman, originally from Ukraine, presented to the emergency department for acute onset of chest discomfort which started 3 hours prior to presentation. Associated symptoms included a racing heart and lightheadedness with a sensation of impending doom. Symptoms started after she heard the news of the bombing of her hometown of Kyiv, where her father and other family members reside. She was not able to get in touch with them and feared that they may have died as a result of the

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**ABBREVIATIONS
AND ACRONYMS****ACS** = acute coronary syndrome**SIC** = stress-induced cardiomyopathy

active war. She had also experienced a 56-pound unintentional weight loss since the beginning of the Russia-Ukraine war.

She was not on any prescription medications. She did not smoke cigarettes, drink alcohol, or use recreational drugs.

On presentation, her blood pressure was 112/91 mm Hg, heart rate 88 beats/min, temperature 97.9 °F, and respiratory rate 22 breaths/min with an oxygen saturation of 99% on room air. The patient appeared tearful and anxious. The physical exam was unremarkable.

PAST MEDICAL HISTORY

Hyperlipidemia, mild intermittent asthma, and major depressive disorder.

DIFFERENTIAL DIAGNOSIS

Acute coronary syndrome (ACS), acute heart failure, left ventricular outflow obstruction, type II myocardial ischemia, microvascular angina, vasospastic angina, myocarditis, and pulmonary embolism.

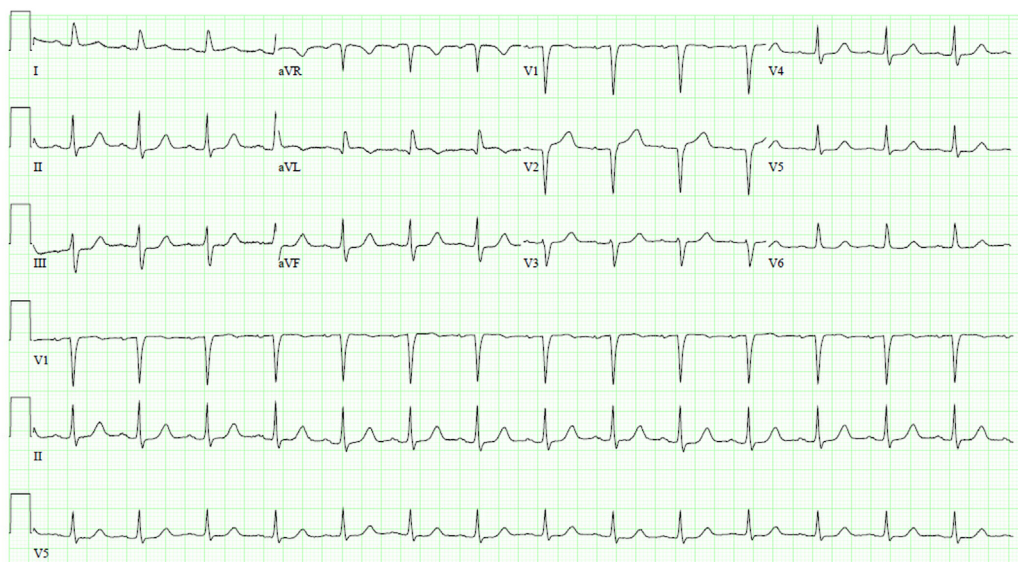
INVESTIGATIONS

Electrocardiogram revealed normal sinus rhythm with minimal ST-segment elevation in leads aVL and V₂ (Figure 1).

No prior electrocardiogram was available for comparison. Chest x-ray showed no evidence of an acute cardiopulmonary process. COVID-19 testing with a nasopharyngeal swab was negative. On laboratory investigations, D-dimer was 310 ng/mL (normal <500 ng/mL), N-terminal pro-B-type natriuretic peptide was 318 pg/mL (normal <125 pg/mL), creatine kinase-myocardial band was 11.9 ng/mL (normal <4.4 ng/mL), and troponin T was 0.301 ng/mL (normal 0.000-0.029 ng/mL). Hemoglobin was 10.9 g/dL (normal 11.5-15.5 g/dL) and mean corpuscular volume 113.2 fL (normal 80-100 fL).

MANAGEMENT

The patient was diagnosed with ACS. In the ambulance, she had received aspirin 325 mg orally and nitroglycerin 0.4 mg sublingually. In the emergency department, she was treated with nitroglycerin and heparin infusions intravenously for ACS. For anxiety, she was given diazepam 2.5 mg orally and 0.5 mg intravenously along with fentanyl 25 mg intravenously. The patient was admitted to the cardiac unit and was treated with metoprolol 12.5 mg twice daily, atorvastatin 80 mg daily, vitamin B₁₂, and aspirin 81 mg daily. Her borderline megaloblastic anemia was attributed to vitamin B₁₂ deficiency with a level of <150 pg/mL (normal 232-1,245 pg/mL). Non-emergent coronary angiography was performed that

FIGURE 1 Electrocardiogram

Minimal ST-segment elevation in leads aVL and V₂.

FIGURE 2 Coronary Angiography



Patent left and right coronary circulation.

revealed mild plaque without significant obstruction in the left circumflex coronary artery and no significant atherosclerotic plaques in the rest of the coronary arteries (**Figure 2**, **Videos 1 and 2**).

A transthoracic echocardiogram was obtained, which revealed moderately decreased left ventricular systolic function with a calculated ejection fraction of $35\% \pm 5\%$ with wall motion abnormalities in the mid to apical anterior, lateral, inferior, and septal segments consistent with SIC (**Figure 3**, **Video 3**).

Based on these findings, the patient was diagnosed with SIC. She remained in the hospital overnight for observation and was discharged the following day with a prescription for metoprolol tartrate 12.5 mg twice daily and atorvastatin 80 mg once daily.

DISCUSSION

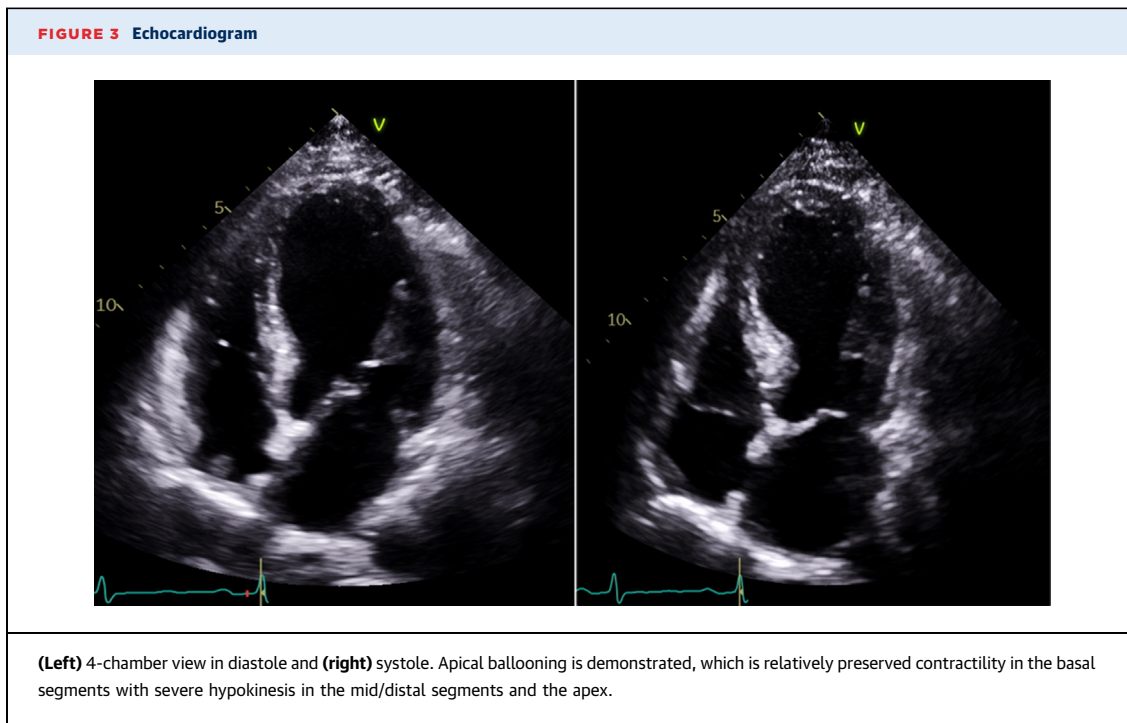
SIC is a well-established form of acute and reversible left ventricular dysfunction as a result of a significant catecholamine surge in the body. Such catecholamine surge in at-risk patients is generally preceded by an identifiable emotional or physical trigger. Several hypotheses have been proposed to explain the effect of elevated catecholamine on cardiovascular physiology. These include plaque rupture with rapid lysis, epicardial coronary artery vasospasm, microvascular dysfunction, or direct catecholamine-induced myocyte toxicity. Factors predisposing patients to develop SIC include female sex, postmenopause, genetic, and prior psychiatric conditions. Despite the reversible nature of SIC, the prognosis is still poor, with similar early and late mortality as seen in patients with ACS.³

The InterTAK (International Takotsubo Registry) has developed a tool to score and predict the diagnosis of SIC. Patients with a score of 70 or more have a >90% probability of SIC. Reported patient had a score of 78 with a 96% probability of SIC.⁴

The direct consequences of war are undoubtedly catastrophic. However, they represent only a small portion of its overall impact when compared to the long-term indirect effects on the physical, psychological, social, and financial well-being of a nation and its people.^{4,5} The mental health effects of war are profound; the World Health Organization estimates that about 10% of the affected population will experience immediate serious mental health events, while another 10% will develop behavioral health disorders due to armed conflicts.⁶

Post-traumatic stress disorder is prevalent in patients with SIC, and evidence suggests that it may have other cardiovascular consequences. One study found that post-traumatic stress disorder doubled the risk of coronary artery disease among Vietnamese war veterans.⁷ Another study investigating patients living in New York City during the 9/11 attack demonstrated a 2.3-fold increase in the risk of ventricular tachyarrhythmias in the first month following the stressful event.⁸

A recent retrospective study evaluated Syrian refugees with coronary artery disease and found a significant association between war-related stressors and the complexity and severity of coronary artery disease. The strongest war-related correlation was observed with crossing “green-lines,” the land between warring sides. Syrian refugee patients who had crossed such lines had significantly higher SYNTAX



(Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery) scores, a grading system that evaluates the complexity and prognosis of patients undergoing percutaneous coronary intervention.⁹

Wars lead to abnormal surge in the circulating catecholamines, which is a critical trigger for the development of SIC.¹⁰ Although there have been numerous wars throughout history, in our search, we found only 2 cases reported in the published reports.^{11,12}

This case report exemplifies the far-reaching indirect consequences of the Russia-Ukraine war, showcasing how a patient living thousands of miles away from the conflict experienced SIC due to the stress and anxiety caused by inability to connect with family in the war-torn region of Kyiv.

FOLLOW-UP

The patient was recommended to follow-up with cardiology as an outpatient. She was contacted via phone call when she reported moving out of state, undergoing psychotherapy, and feeling much better.

She is avoiding watching the news, and she made a 6-month follow-up appointment with Cardiology, which has yet to occur.

CONCLUSIONS

The incidence of SIC has seen a significant rise in recent years, particularly in the context of the COVID-19 pandemic. This case report underscores the indirect repercussions of the Russia-Ukraine war, illustrating that the effects of conflict extend beyond the immediate battlegrounds and may manifest in unexpected ways.

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KEY WORDS acute heart failure, cardiomyopathy, echocardiography, reduced ejection fraction, secondary prevention

APPENDIX For supplemental videos, please see the online version of this paper.