CASE REPORT

Myocardial infarction without coronary artery occlusion following mental stress

Shafeajafar Zoofaghari[1], Fariborz Nikaen[2], Shahrzad Bahramsari[1], Mozhdeh Hashemzadeh[3], Gholamali Dorooshi[1]

[1]Isfahan Clinical Toxicology Research Center, Department of Clinical Toxicology, Isfahan University of Medical Sciences, Isfahan, Iran, [2]Department of Cardiology, School of Medicine, Najafabad Branch, Islamic Azad University, Najafaba, Iran, [3]Clinical Informationist Research Group, Health Information Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Myocardial infarction (MI) with nonobstructive coronary arteries (MINOCA) is syndrome with clinical evidence of acute MI (AMI) with normal coronary arteries. This study reports the case of a 23-year-old single woman referring to the hospital with clinical manifestations of MI, with electrocardiography findings of slow ventricular tachycardia or accelerated idioventricular rhythm and atrioventricular dissociation, and high troponin levels, which was admitted with the diagnosis of MINOCA due to mental stress (grief) and was discharged after 4 days of monitoring and following stabilization of conditions and absence of symptoms. Other causes of MINOCA ruled out through imaging studies. Mental stress can lead to MINOCA.

Key words: Coronary artery, myocardial infarction, stress, troponin

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INTRODUCTION

Myocardial infarction (MI) with no obstructive coronary atherosclerosis (MINOCA) is a distinct clinical syndrome characterized by evidence of MI with normal or near normal coronary arteries on angiography. MINOCA is a syndrome with multiple potential causes. They may involve the epicardial vessels and/or the coronary microcirculation.[1] Coronary artery spasm, acute thrombosis at the site of nonobstructive eccentric plaque thrombosis, Takotsubo cardiomyopathy, coronary microvascular dysfunction, viral myocarditis, and coronary artery embolism can be considered as the causes of MINOCA.[2] The clinical presentation of MINOCA patients is similar to that of acute coronary syndrome (ACS) patients with obstructive coronary artery disease (CAD). However, MINOCA patients are younger and more often women.[3] The prevalence of MINOCA among all cases of MI is about 6% and ranges between 1% and 14%, and its mortality is lower than MI and CAD (2%–3.3% in year).[4]

The management of MINOCA is due to the underlying cause. In the current clinical practice, the treatment for MINOCA patients is highly variable. Secondary prophylactic drugs are less frequently used in these patients than in patients with CAD and in women less than men.[5] This is likely to indicate a lack of transparency regarding the mechanisms involved in individuals and groups of patients.[6] Some physicians may not be confident about the diagnosis of these patients compared to patients with severe CAD with MI.[7] Since the rising of troponin that can happen due to tension and neurologic stress, or due to pathological mechanisms underlying infarction in absence of coronary artery obstruction (CAO), the importance of systematic research to reach a definitive diagnosis and proper treatment is highlighted.[8] In this study, we report a MINOCA case of a 23-year-old woman which complained of retrosternal chest pain that extended to the left arm, nausea, vomiting, and dyspnea with no history of cardiovascular diseases.

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Address for correspondence: Dr. Mozhdeh Hashemzadeh, Clinical Informationist Research Group, Health Information Research Center, Isfahan University of Medical Sciences, Isfahan, Iran. E-mail: mojdeh.hashemzadeh@gmail.com

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CASE REPORT

A 23-year-old 60 kg-weighted single woman referred to Shariati Hospital, Isfahan, Iran, with history of depression and acute mental stress following an episode of grief with no drug abuse and coronary risk factors (she did not present any information about her substance abuse) and no recent respiratory infections except recently use of sertraline 50 mg and trifluoperazine 1 mg daily orally for reducing stress. She complained of retrosternal chest pain that extended to the left arm, nausea, vomiting, and dyspnea. On the electrocardiography (ECG), ST-T segment changes [Figure 1a], slow ventricular tachycardia or accelerated idioventricular rhythm, and atrioventricular dissociation were observed. In serial ECGs, the heart rhythm became sinusoidal after 6 h.

At admission, her heart rate was 105 bpm [Figure 1a] and the blood pressure was 130/100 mmHg. Chest pain severity reduced through 25 mg meperidine intravenously ordered and 1.5 mg midazolam pushed to calm her. The jugular venous pressure was not elevated. The cardiovascular and pulmonary examinations were normal. Blood sugar was normal. D-dimer was 132 ng/dl (normal range up to 500). Troponin levels from 40,000 ng/L (normal range up to 100 ng/L) and CPK-MB (A cardiac marker to diagnosis the acute myocardial infarction) from 22.9 ng/ml at admission reached 273 ng/L and 20 ng/ml in following days (normal range up to 24 ng/ml). We did not check the urine sample for drug abuse. Erythrocyte sedimentation rate was normal, and the patient had no leukocytosis and fever.

The patient was transferred to the coronary care unit and managed with aspirin 80 mg daily, Plavix 75 mg daily, atorvastatin 20 mg daily (after loading doses for ACS), and diltiazem 90 mg bid (for probability of spasm). For managing her mental disorder, trifluoperazine 1 mg and valproic acid 200 mg daily were ordered after psychiatric consulted. Echocardiography report was as follows: mitral valve ++, moderate systolic dysfunction and normal diastolic function, and akinesia in base septal, base inferior, mid posterior, and mid lateral segments, EF (Ejection fraction): 45% with no apical ballooning and left ventricular hypertrophy. The right ventricle size was normal and no other valvular abnormalities seen. We did not perform cardiac magnetic resonance imaging. Emergency coronary angiography (diagnostic for ACS) showed coronary arteries without obstruction and no abnormalities were seen [Figure 2]. For ruling out of spasm and congenital abnormalities, coronary computed tomography angiography was done and reported normal and antiphospholipid antibodies were negative. According to the above points and the patient stated that she had been under severe mental stress in the previous day, MINOCA due to mental stress was mentioned, and other causes of MINOCA such as coronary artery spasm, acute thrombosis at the site of nonobstructive eccentric plaque thrombosis, Takotsubo cardiomyopathy, coronary microvascular dysfunction, viral myocarditis, and coronary artery embolism ruled out.

Transthoracic echocardiography and ECG were normal at discharge [Figure 1b], left ventricular size and function were normal, and no evidence of wall motion abnormalities was seen. She was discharged after 4 days with continued administration of aspirin and Plavix.

DISCUSSION

In the present study, the case was a young woman who had no previous history of heart problems, hypertension, embolism, etc., The literature review showed predictors of MINOCA in MI patients as gender, younger age, and race.[8,9] Camastra *et al.* in their study showed that a small group of MINOCA with normal angiography have significant biochemical evidence of myocardial injury and had no evidence of subendocardial injury, wall motion abnormalities, or myocarditis.[10]

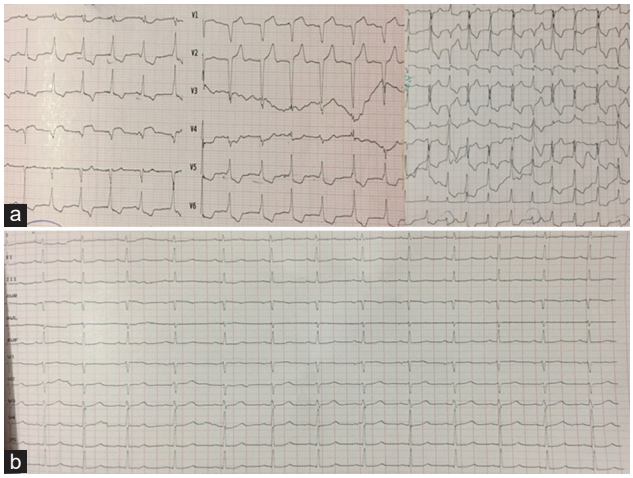

Figure 1: Electrocardiography on arrival (a) and time of hospital discharge (b)

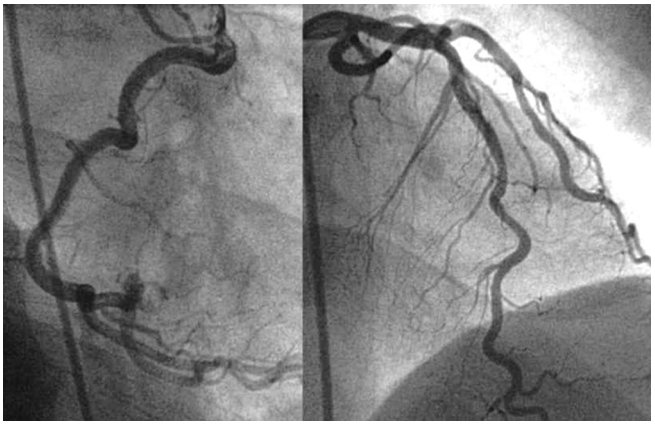

Figure 2: Angiogram showing unobstructed coronary arteries

The relation between MI and psychiatric disorders previously has been reported.[11] Studies reported that cardiovascular risk factors were more in patients with psychiatric disorders.[12] However, in the present study, the patient suffers from psychiatric disorders without a history of heart problems.

Some studies reported that optimistic patients have a better prognosis after MI,[13] whereas the others showed that heart disease is linked with a worse outlook.[14] This result agrees with the present hypothesis stated that negative emotions could be considered as a MINOCA risk factor that could be ascribed to the impact of emotions on adrenergic regulation and its relationship with endothelium function,[15] which is assumed to be one of the responsible and underlying pathophysiological mechanisms of MINOCA.[16] Therefore, if these findings confirmed, it could be an indicator for the importance of primary prevention in the patients of high risk to general practitioners and on the other hand, provide a new target for secondary prevention.[17]

Perk *et al.* in their study showed that stress and anxiety seem to increase cardiovascular vulnerability and elevate cTnT level.[18] Lazzarino *et al.* emphasized that cTnT not only reflects prevalent cardiac abnormalities but also a risk pattern portending to their development.[19] Other studies showed that cTnT is associated with hypertension, smoking, obesity, hyperlipidemia, and diabetes.[20,21] However, our case had none of these factors, so we thought that the main reason for her chest pain and significant rising in troponin-T were due to mental stress. Hence, according to paraclinics' results mentioned above, we concluded that the mental stress induced MI in our patient, and this is the first case report written in this topic.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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