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ST-segment elevation differential diagnosis in a patient with ovarian cancer: A case report

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Abstract

Across the world the incidence of cancer is predicted to increase by 47% over the next 20 years. Increasingly, cardiologists will be faced with patients presenting with acute coronary syndromes, who are receiving active treatment for cancer. On the other hand, metastasis of malignant tumors to the heart is not usual but can present with various clinical features such as pericardial effusion, heart failure, arrhythmia, and myocardial infarction. Rarely, they may cause characteristic electrocardiographic changes, resembling ST-segment elevated myocardial infarction (STEMI). Decision making in this scenario is complex and requires detailed knowledge of the patient's cancer stage, response to cancer treatment, and overall prognosis. Proper diagnosis is critical in these patients to prevent unnecessary or even harmful interventions such as fibrinolytic therapy. We reported a 45-year-old woman with a history of ovarian carcinoma, who presented with atypical chest pain and ECG findings suggestive myocardial infarction. But after full investigation we realized these ECG changes were due to the myocardial invasion of the tumor not coronary atherosclerosis and obstruction.

Keywords: Metastatic Tumor; ST-Segment Elevation; Myocardial Infarction; Myocardial Invasion; Secondary Cardiac Tumor

Introduction

Cardiac tumors comprise primary tumors, including benign and malignant, and metastatic tumors. Secondary cardiac tumors occur much more frequently than primary cardiac tumors. But despite their higher frequency, their symptoms are often overlooked because of disseminated disease and lack of survival[1].

Metastatic tumors can involve each part of the heart. They frequently cause pericardial effusion, but rare cases of myocardial invasion have been reported, which can result in ST-segment elevation myocardial infarction. Misdiagnosis of these patients could result in improper or even harmful treatments[2]. Fortunately, today, with various imaging techniques, detection of metastatic cardiac involvement has been improved. As a convenient and rapid modality, echocardiography often plays the primary role in finding lesions, confirming the extent of the lesions, and assessing cardiac function.

Here, we report a rare case of ovarian carcinoma metastasis to the heart, presented with persistent ST-segment elevation due to myocardial invasion.

Case presentation

A 45-year-old female had been diagnosed with ovarian cancer and lung metastasis 3 months ago, and chemotherapy was prescribed for her. She presented to the emergency department complaining of atypical chest discomfort and dyspnea.

Her blood pressure was 105/65 mmHg and the pulse rate was 100 beats/min. Chest X-ray showed moderate cardiomegaly with haziness of the left lung lower lobe. Her ECG showed sinus rhythm with ST-segment elevations in V4–V6, lead I, and inferior leads (Figure 1). She was diagnosed as acute ST-segment myocardial infarction. Her CK-MB level was 26 U/L and her troponin was negative. She also had anemia (Hb: 10.8 g/dL). Other laboratory tests were unremarkable. After initial stabilization, she was referred to our center for coronary angiography.

The patient arrived at our center within 2 hours, and at that time, chest pain had improved. Soon after arrival, echocardiography was performed and revealed pericardial effusion with increased thickness of the anterolateral and inferolateral walls, with multiple cystic lesions protruding from the myocardium toward the LV cavity (Video 1–3 and Figure 2). Echo data were in favor of myocardial invasion by tumor. The ST elevations remained unchanged, and serial cardiac troponin measurements were negative.

Due to chest pain improvement, negative enzyme results, and echo findings, we decided

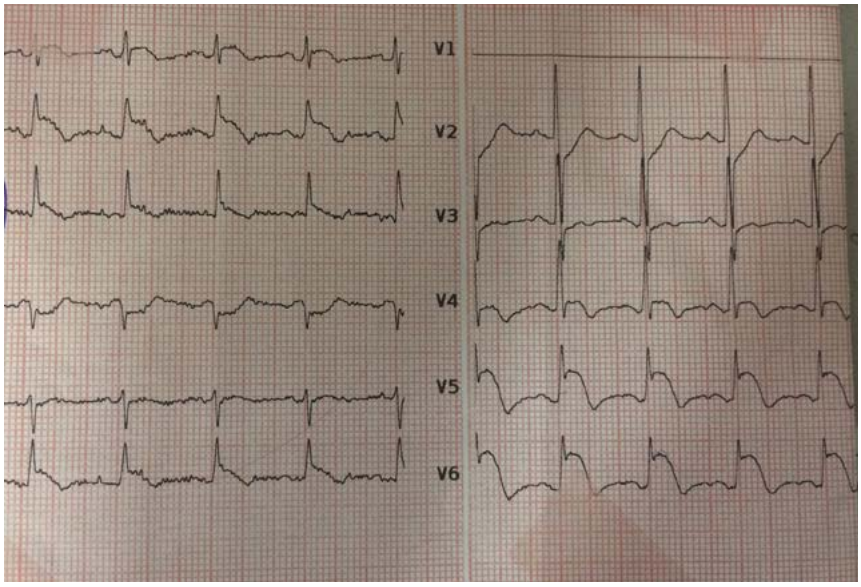

Figure 1. ECG changes that mimic ST-elevation MI

Figure 2. Tumor invasion of the myocardium on echocardiography

not to perform coronary angiography. The patient was referred to the oncology department. Her clinical condition deteriorated due to disseminated disease and brain metastasis. Unfortunately, she died 1 month later.

Discussion

Metastatic tumors involve the heart more frequently than primary cardiac neoplasms. The incidence of secondary tumors is variable and reported from 1.5–21% in the literature[3]. The most common primary tumor that metastasizes to the heart is lung tumor, but other cancers such as lymphoma, breast cancer, stomach cancer, and ovarian cancer can involve the heart[4]. Metastasis can spread to the heart via lymphatic or hematogenous routes or by direct or transvenous extension[5].

The more common manifestation of cardiac metastasis is pericardial effusion. Endocardial and myocardial involvement is rare. Myocardial invasion can result in heart failure, arrhythmia, or ischemia[6].

Some patients with secondary cardiac cancer may develop symptoms mimicking acute coronary syndrome (ACS) and exhibit ECG changes suggestive of STEMI, although ECG is non-diagnostic in most cases with myocardial invasion. According to reported cases, the most frequent abnormality was ST-segment elevation in the lateral leads (I, aVL, and V5/V6). Toshihiro et al. showed that the leads with ST-segment elevation may reflect the location of the myocardial tumor. They also found that ST-segment elevation due to metastatic cardiac cancer is persistent and Q-wave formation is rare[7].

Considering these findings, a normal cardiac enzyme level may be another distinctive feature in patients with ST-segment elevation due to metastatic cardiac cancer. A normal cardiac enzyme level could exclude coronary artery obstruction[8].

Imaging modalities are very helpful for correct diagnosis and guidance of appropriate therapy. A two-dimensional transthoracic echocardiogram is the most common initial tool used for the diagnosis of metastatic cardiac cancer. Echocardiography can show pericardial and myocardial involvement. Other imaging modalities are CT and CMR[9].

Diagnosis of cardiac involvement in cancer patients presenting with ST-segment myocardial infarction is crucial for their proper management and avoidance of harmful treatments such as thrombolytic therapy. Also, it indicates disseminated disease and lack of survival. In most cases, treatment will be palliative.

Conclusion

In patients with a history of malignancy presenting with chest pain and ECG changes suggestive of myocardial infarction, one of the important differential diagnoses is myocardial invasion due to metastasis. Persistent ST-segment elevation without Q-wave formation and negative enzymes could exclude the probability of coronary occlusion in these patients. Cardiac imaging is very useful for diagnosis. Unfortunately, these patients generally have a poor prognosis. But the proper diagnosis prevents further unnecessary interventions or even harmful treatments such as thrombolytic therapy.

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Conflict of interests

The authors declare no conflict of interest.

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Author's Contributions

Study Conception or Design: FDT; RP
Data Acquisition: FDT
Data Analysis or Interpretation: MEM; SMSH
Manuscript Drafting: FDT; SMSH
Critical Manuscript Revision: MEM; RP
All authors have approved the final manuscript and are responsible for all aspects of the work.

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