

Electrocardiographic Changes Mimicking Acute Coronary Syndrome in a Metastatic Cardiac Tumor: A Case Report

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Abstract: *Electrocardiographic abnormalities are commonly seen in cases with metastatic invasion of the heart. However, most of these changes are nonspecific; certain findings may be highly suggestive of myocardial tumor invasion. We report a patient with lung cancer who presented with ST-segment elevation on electrocardiogram (ECG), myocardial invasion of lung cancer on echocardiogram (ECHO) and with mass invasion of pericardium and epicardium on computed tomography (CT) chest.*

Keywords: CT: Computerized Tomography, ECHO: Echocardiography, MI: Myocardial Infarction, STEMI: ST segment elevation myocardial infarction, ACS: Acute coronary syndrome

1. Introduction

Myocardial infarction (MI) is defined as a clinical or pathological event due to myocardial ischemia causing myocardial injury or necrosis. The ECG is the first diagnostic test in patients with suspected acute coronary syndrome (ACS). ST elevation myocardial infarction (STEMI) is a medical emergency, and the benefit of reperfusion therapy is significant when performed early. But several conditions may present with similar electrocardiographic pattern as STEMI^[1] such as; transient ST-segment elevation^[2] pericarditis and myocarditis^[3],⁴ takotsubo cardiomyopathy (TTC)^[5] pulmonary embolism and aortic dissection^[6, 7] acute stroke and subarachnoid hemorrhage (SAH)^[8]. Others are acute cholecystitis or pancreatitis^[9, 10] pneumonia^[11] pneumomediastinum^[12] gastric distention and intestinal obstruction^[13, 14, 15] and primary brain tumor^[16].

However the occurrence of ST elevations in association with neoplastic invasion of myocardium is uncommonly described in the literature. We intend to report a patient with lung cancer who presented with ST elevation on ECG, myocardial invasion of lung cancer on ECHO and with mass invasion of pericardium and epicardium on CT chest.

2. Case Report

A 71-year-old female with history of non-small cell lung cancer (NSCLC), treated with pemetoset and radiation therapy,

recently diagnosed with brain metastases, presented to the emergency department (ED) with erratic heart rate. Patient was admitted late due to shortness of breath and atrial fibrillation with rapid ventricular rate (RVR) treated with amiodarone and cardizem. On consultation, Eliquis and Metoprolol were stopped. Patient underwent palliative radiation to brain followed by the CyberKnife radiation therapy for 5 days where she had a partial response. Following a couple of weeks while sitting in the chair patient developed shortness of breath, suddenly. Patient was brought to the ED by family where she stated that she also used home pulse oximetry and noted tachycardia but denied any chest pain, lightheadedness, nausea or vomiting. Patient stated that this episode was similar to previous when she had atrial fibrillation with RVR. In the ED, ECG revealed ST elevation in the inferior and lateral leads; II and aVL, with ischemic changes inferiorly. The related risk/benefits of potential bleeding with intervention given her metastatic disease were discussed with the cardiology. Patient remained symptomless and serial cardiac enzymes at 6 hours and 24 hours later also remained within the normal ranges. These findings helped us to exclude the presence of MI. However, the transthoracic ECHO showed myocardial invasion of lung cancer. Subsequently, the CT chest findings demonstrated mass invasion of the pericardium and lateral epicardium which appeared to be the cause of her lateral ST segment elevation and will less likely improve. Patient was relatively stable at her baseline for discharge home. Patient was not interested in local hospice care yet.

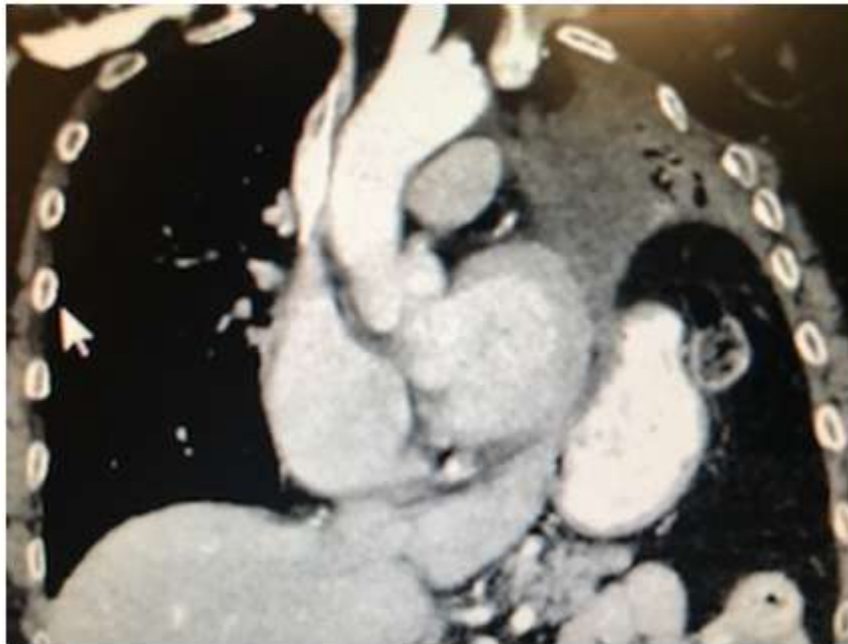


Figure 1: CT scan shows the invasion of myocardium with cancer



Figure 2: EKG showing ST elevation MI

3. Discussion

Firstly, metastatic tumor is nonspecific and clinically silent in the heart and myocardial metastasis hardly mimics MI^[17]. Secondly, secondary involvement of heart by the metastatic cancer is comparatively rare and usually occurs in highly disseminated disease^[18]. Thirdly, ECG changes in cardiac metastasis are nonspecific for tumor invasion and are difficult to differentiate from those associated with pre-existing heart disease and/or cardiotoxicity from cancer treatment^[19]. And finally, there are multiple isolated reports of ECG abnormalities related with the metastatic cardiac tumor^[19-24]:

- Myocardial changes; segmental or diffuse T wave inversion, and ST-segment elevation.

- Conduction system changes; bundle branch block, fascicular block, atrioventricular block, atrial fibrillation, arterial flutter, and paroxysmal arterial tachycardia.
- Pericardial changes; ST-segment elevation and electrical alternans.
- Nonspecific changes; sinus tachycardia, nonspecific ST and T-wave abnormalities, low voltage, premature contractions.
- Multiple combined abnormal ECG patterns.

Initially in this case, the ECG showed ST-segment elevation in inferior and lateral leads without symptoms of myocardial ischemia. In addition, there was no arrhythmia such as supraventricular tachycardia (SVT) or ventricular tachycardia (VT). Cates, *et al* reported the patients with cardiac metastasis on autopsy and found a few patients with ST-segment elevation on ECG^[19]. Next in this case, there

was only lateral ST-segment elevation due to cardiac metastasis of the lung cancer which differentiated our case from previous reports^[25, 20]. Samaras, *et al* reported more pronounced ST-segment elevations in relation to the myocardial metastasis of primary lung cancer^[26]. But in this case, there was no progression of ST-segment elevation and worsening of myocardial metastasis. By including ST-segment elevation imitating acute MI, any new ECG changes raising the suspicion of cardiac metastasis should be managed properly in the cancer patient.

4. Conclusion

In the absence of clinical symptoms of ACS in patients with malignancy, any new ECG changes typically of myocardial ischemia should lead to proper work-up to exclude cardiac metastasis.

5. Financial Declaration

No author participating in this study has any financial conflict.

6. Abbreviations

CT: Computerized Tomography
ECHO: Echocardiography
MI: Myocardial Infarction
STEMI: ST segment elevation myocardial infarction
ACS: Acute coronary syndrome.

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