

Cardio-Invasive Metastatic Squamous Cell Carcinoma of the Lung Masquerading as Acute ST Elevation Myocardial Infarction

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Introduction:

Myocardial metastatic cancer is rare, and diagnosis is challenging. Supradiaphragmatic malignancies are the most common to metastasize to the heart. Endocardial involvement is rare, followed by involvement of the pericardium, epicardium, and myocardium. Myocardial metastasis leads to varied clinical presentations ranging from arrhythmias, congestive heart failure, myocardial infarction, and intracavitary mass lesions (1). We are describing a patient with a prior diagnosis of coronary artery disease (CAD) and Coronary artery bypass graft (CABG) presenting as recurrent ST-elevation myocardial infarction (STEMI) and diagnosed with cardiac metastasis from lung squamous cell carcinoma (SCC).

History:

A 63-year-old with a history of CAD and CABG presented from cardiac rehabilitation (CR) with acute onset chest pain and shortness of breath. The patient underwent CR after an acute myocardial infarction one week ago. During that time, he had a similar presentation with chest pain and dyspnea and was diagnosed with anteroseptal STEMI. Emergent percutaneous coronary intervention (PCI) revealed severe stable CAD with patent left internal mammary artery to left anterior descending artery (LAD), Saphenous vein grafts (SVG) to obtuse marginal, SVG to the diagonal artery, and occluded SVG to right coronary artery (RCA). Considering the ongoing symptoms, a large septal branch was revascularized. The patient became symptom-free, and ECG normalized. Following his discharge at CR, he experienced similar symptoms and was sent to the emergency department for further evaluation.

Past medical history:

The patient had a medical history of CAD with CABG, peripheral arterial disease with multiple interventions, paroxysmal atrial flutter, hypertension, dyslipidemia, diabetes mellitus type 2, deep vein thrombosis, and ischemic stroke with residual aphasia. The patient had a lung cancer screening with low-dose CT a year ago without suspicion of malignancy.

Investigations:

ECG showed septal ST-segment elevation with reciprocal depression in the inferior and lateral leads (Fig-

ures 1 and 2). His high-sensitivity troponin was 115 ng/L. Chest x-ray showed bilateral atypical infiltrate superimposed with pulmonary edema (Figure 3).

Procedure:

The patient underwent emergent cardiac catheterization, showing similar findings as the last angiogram; however, due to persistent chest pain, revascularization of the RCA with two drug-eluting stents (Figures 4 A - E) was done. He had persistent symptoms despite revascularization. A transthoracic echocardiogram (TTE) revealed reduced LVEF at 38% and a mass compressing the right ventricular apex (Figures 5 A - C). A cardiac magnetic resonance imaging (MRI) showed a large fungating invading mass on the superior left upper lung field near the bifurcation of the pulmonary artery (Figures 6 A & B). This mass had originated outside the pericardium, infiltrating the surrounding structures, including the superior aspect of the right ventricle, pulmonary artery, and mediastinal tissue. A chest Computed Tomography (CT) demonstrated a large invasive anterior mediastinal mass measuring 10.5 x 8.4 x 6.9 cm, consistent with MRI. (Figure 7). CT-guided biopsy finally revealed malignant SCC. A positron emission tomography scan and brain MRI revealed metastases to the brain and adjacent lymph nodes (Figures 8 A - D). Chemotherapy was not tolerated well due to severe axonal neuropathy. Following an extensive discussion about the prognosis, the family and the patient opted for hospice care.

Discussion:

Lung cancer is the most common malignancy worldwide, contributing to 1.8 million deaths in 2018 (2). This cancer typically metastasizes to the liver and adrenal glands via hematogenous spread (3). Metastatic cardiac masses usually affect the pericardium due to preferential metastatic pathways involving lymphatics. Myocardial metastatic involvement from lung cancer is infrequent (4). Histopathologic differentiation of lung malignancy has a differential predilection to cardiac metastases, with lung adenocarcinoma contributing to 21% and lung SCC contributing 18.2% of total secondary cardiac tumors (1). The most common presentation of patients with cardiac metastasis depends on the type of involvement and the anatomic location. Patients can present with dyspnea, pedal edema, chest pain, palpitation due to various arrhythmias, and life-threatening presentations such as syncope, stroke, cardiac tamponade, cardiac rupture, acute myocardial infarction, pulmonary embolism, and sudden cardiac death (5). Abe et al., 1991 conducted a study on 151 lung cancer patients; 11.9% of these patients had myocardial involvement (6). Similarly, Cate et al., 1986 performed a retrospective analysis on 1046 patients and reported that new onset ECG changes highly suggest myocardial involvement in a clinically stable patient with malignancy (7). However, it is essential to remember that cardiac involvement is asymptomatic in most patients diagnosed with postmortem, precluding obtaining an ECG. TTE remains the diagnostic modality of choice, followed by conformation with additional imaging and biopsy.

The described patient had significant risk factors for lung cancer, including smoking and age. However, he had a normal screening CT scan done one year ago. Chest x-rays from the current and last admission showed nonspecific findings and failed to demonstrate lung mass. During his first “STEMI,” the patient presented with chest pain and ST-segment elevation with reciprocal changes and elevated cardiac biomarkers, revealing stable severe CAD with patent grafts. However, after the initial PCI, the patient’s condition improved, and other diagnostic studies did not suggest malignancy, so he was discharged. In his second admission with “STEMI,” he has a similar representation, leading to a coronary angiogram. The RCA was revascularized, assuming it must be the culprit lesion. A subsequent TTE showed the suspicion of cardiac mass, leading to a cardiac MRI and biopsy, revealing the diagnosis of invasive SCC of the lung metastasizing to the myocardium. The following pathways are identified for secondary cardiac metastasis: a) Hematogenous, b) lymphatic, c) transvenous, and d) direct extension. The hematogenous route leads to myocardial involvement. The lymphatic and direct extension leads to pericardial involvement (8). The described patient has myocardial involvement, indicating hematogenous metastasis. However, the patient had adjacent lymph node involvement but, surprisingly, no pericardial involvement.

The left upper lung mass remained undiagnosed despite multiple prior imaging modalities, including screening

low-dose CT scans and numerous chest X-rays. A TTE in the presence of recurrent symptoms and persistent ST-segment elevation led to further investigations and diagnosis. In the described case, due to the presence of severe native CAD, it was difficult to exclude ischemic etiology. Patients with normal coronary arteries or mismatched ST elevation should undergo further investigations before discharge.

Conclusion:

The case emphasizes the importance of differential diagnosis when patients present with recurrent STEMI-like symptoms despite optimal invasive treatment. The patient was finally diagnosed within three weeks of the first presentation. Cardiac involvement is a late presentation of metastatic lung cancer, so the outcome might not change, but unnecessary invasive studies could have been avoided. Discussing the management of invasive lung carcinoma with cardiac metastasis is beyond the scope of this article.

Learning Objective:

Cardiac metastasis should be included in the differential diagnosis of patients with acute coronary syndrome.

A TTE should be performed in all patients with recurrent myocardial infarction; if the imaging window is suboptimal or suspicion remains high, further imaging modalities should be pursued.

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Competing interests

The authors declare that they have no competing interests.

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