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EC CARDIOLOGY
Case Report

"STEMI" and the Fortuitous Sonographer: Triage Echocardiography to Identify the Imitators of Acute Myocardial Infarction

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Abstract

Cardiac metastasis from malignancies is more common than previously thought. Cardiac metastasis from a squamous cell cancer is uncommon with few cases reported in the medical literature. We report a case of tongue squamous cell carcinoma metastasizing to the heart that was accidentally identified because the patient presented with chest pain and an ECG impersonating a STEMI. The constellation of findings led to an echocardiogram identifying a cardiac mass. The use of echocardiography is essential when evaluating mimickers of STEMI.

Keywords: *Cardiac Mass; Squamous Cell Metastasis; Echocardiography; Cardiac MRI; Pathology*

Introduction

Cardiac metastasis from malignancies is more common than previously thought. Cardiac metastasis from a squamous cell cancer is uncommon with few cases reported in the medical literature.

Brief Report

In November 2016 a 43 year - old male presented to the emergency department (ED) with chest pain. He was walking in the woods in the snow and after about one mile he developed a tightness and pressure in his upper sternal region. He had been a twenty-year smoker but quit in 20014 when it was identified that he had leukoplakia with severe dysplasia on his tongue. The patient's father had a history of a myocardial infarction at age 51 years and underwent coronary stenting. Two siblings have hypertension.

His electrocardiogram revealed up coving ST elevation in leads V2-4 and reciprocal changes inferiorly (Figure 1).

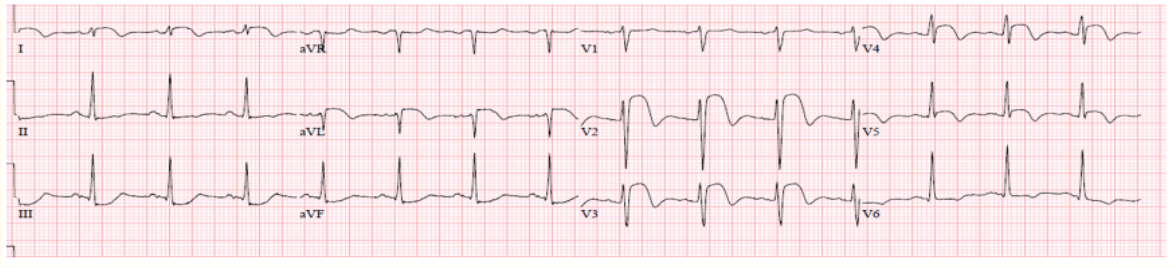

Figure 1: *12 lead ECG demonstrating a simulacrum of STEMI with ST elevation V2-4 and reciprocal ST changes inferiorly*

The STEMI team was summoned. A cardiac sonographer was present imaging a different patient. When she finished the ED physician asked her to image the patient. The image was perplexing. There was a left ventricular mass in the apical anterior lateral wall measuring 4.8 × 2.6 cm. There were small echo lucent areas noted in the mass. The mass texture did not have the appearance of myocardium. Left ventricular (LV) size and function were normal. The calculated LVEF was 63% and global longitudinal strain was (-18%). The on call cardiologist was summoned and generated the differential diagnosis of a thick heart muscle, such as apical HCM, versus a hematoma, versus a metastatic lesion to the myocardium. The STEMI team was called to abort the emergency procedure.

During a follow up visit a computed tomography (CT) scan revealed a subtle density in the right tongue and a tongue biopsy revealed well-differentiated squamous cell carcinoma. Adjuvant chemotherapy and radiation were started immediately.

There was a follow up visit in cardiology clinic in January 2017. The patient was not experiencing any cardiovascular symptoms and his cardiovascular examination revealed normal jugular venous pressure and normal carotid upstroke without bruits. Normal S1 and S2. No gallop, click or rub. Bilateral palpable radial and dorsalis pedal pulses. No edema, clubbing or cyanosis.

Further imaging was performed to better characterize cardiac structure and function. Detailed 2D, 3D and strain imaging was performed to characterize the previous identified LV mass. 2D imaging, 3D imaging and strain imaging were performed revealing normal apical strain pattern. The finding revealed left ventricular mass involving the apical anterior, septal, and lateral wall segments and it measured 4.6 × 2.8 cm. The mass was noted to have abnormal texture compared to normal myocardium and it possessed echo lucent areas likely representing necrosis. The mass was protruding into the left ventricular cavity. Contrast imaging did not reveal any increased perfusion or vascularity. There was no pericardial effusion.

The next day a cardiac magnetic resonance imaging (MRI) was performed (Figure 2) revealing a 3.3 × 4.2 cm mass infiltrating within the apex of the left ventricle. The lack of early or late myocardial enhancement within the lesion may be attributed to central necrosis throughout the metastatic lesion.

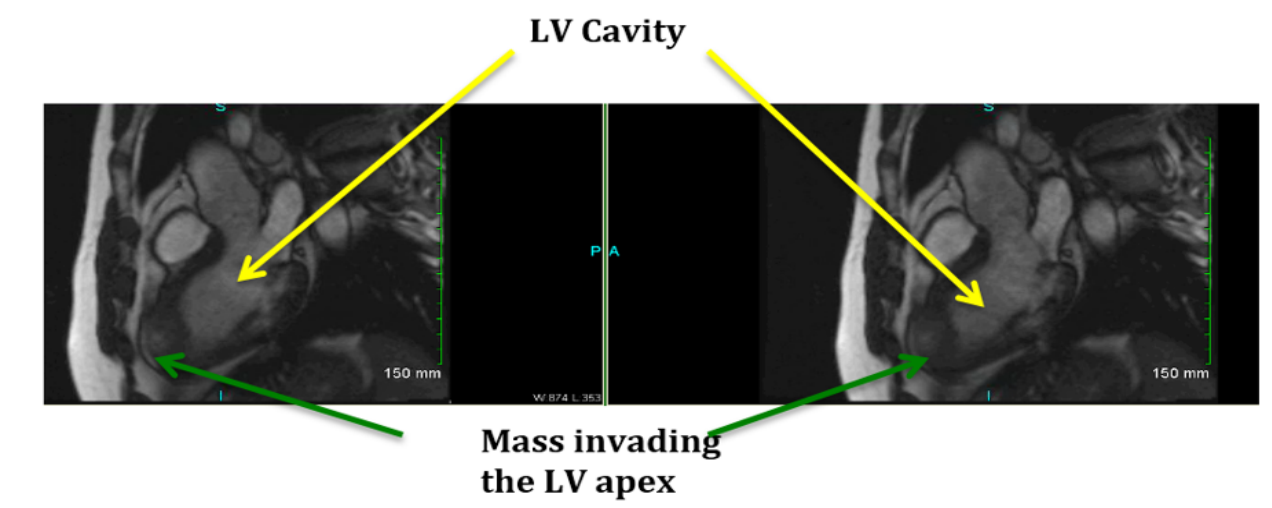

Figure 2: *Apical long axis 3 chamber cardiac MRI, at initial presentation, demonstrating large anterior-apical left ventricular mass. The green arrows are pointing to the LV cavity. The yellow arrows are pointing to the LV mass.*

The echocardiographic and cardiac MRI findings were discussed with the oncologist and the consensus was a tissue diagnosis optimal. After discussion with the patient and his wife a transvenous right ventricular endomyocardial biopsy was performed. The pathology report confirmed metastatic squamous cell carcinoma.

Follow up in December of 2017 revealed that the patient remained free of cardiovascular symptoms and his examination was normal. Repeat echocardiography was performed revealing progression the metastatic mass with significant protrusion and succession into the LV cavity. Contrast images revealed complete obliteration of the distal one-third of the LV cavity. There was a significant loss of the blood volume occupying the LV in diastole.

Repeat cardiac MRI revealed interval progression of the infiltrative tumor mass involving the LV myocardium and the mass measured 4.5 cm × 6 cm. The total volume of the metastatic lesion had increased with cardinal features of central necrosis. There was a new area of myocardial involvement in the lateral free wall (Figure 3). Despite the progressive invasion of the LV cavity the patient remained asymptomatic.

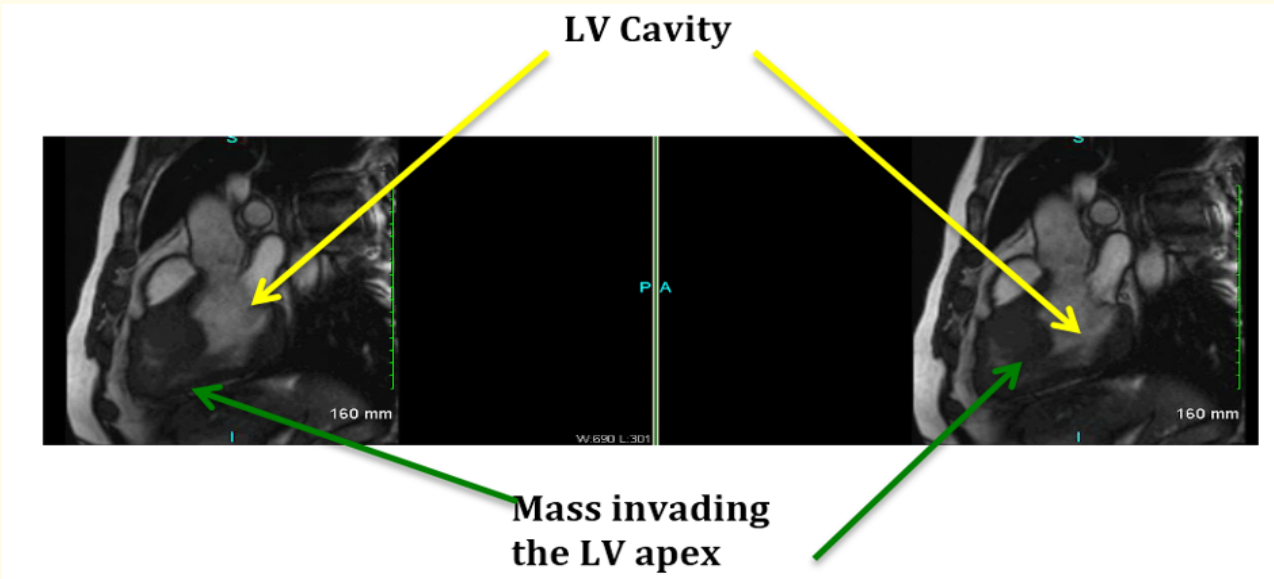

Figure 3: *Modified apical long axis cardiac MRI, taken one year after initial cardiac MRI, demonstrating marked expansion of the left ventricular mass into the left ventricular cavity and extension into the lateral wall. See green arrow.*

Cine 1: Modified apical 2-chamber echocardiogram revealing left ventricular mass in the apical anterior lateral wall and apex. The mass texture is distinctive from the texture of the adjacent myocardium. See yellow arrow pointing to the LV mass. LV: Left Ventricle; MV: Mitral Valve; LA: Left Atrium.

Cine 2: A magnified view of the left ventricular mass: highlighting the mass texture and revealing the small echo lucent areas in the mass probably representing necrosis. The mall yellow arrow is pointing to area of necrosis. LV: Left Ventricle.

Cine 3: Parasternal long axis 3D view: of the left ventricular mass and appearance of vigorous apical contractility. See yellow arrow pointing to the LV mass. LV: Left Ventricle.

Cine 4: Contrast study. Modified apical 4 chamber view of the left ventricular mass, taken one year from original images, demonstrating the left ventricular mass occupying the left ventricular apical cavity with extension to the mid LV cavity with loss of apical contractility and absence of vascularity. See yellow arrow. LV: Left Ventricle.

Cine 5: Contrast study. Modified apical 2-chamber view with contrast: demonstrating the left ventricular mass occupying more than one half of the left ventricular cavity. See yellow arrow pointing out the loss of LV cavity. Note loss of apical contractility.

Discussion

Cardiac metastases are more common than primary cardiac tumors. Metastasis to the heart is more frequent than previously thought. Although primary cardiac tumors are rare (generally between 0.01% and 0.1% on postmortem analysis), the frequency of secondary metastatic tumors to the pericardium, myocardium [1], great vessels, or coronary arteries is between 0.7% and 3.5% at autopsy in the general population and up to 9.1% in patients with known malignancies [1-5]. Additionally, the risk of cardiac metastasis rises with metastatic disease burden; 14.2% of patients with multiple distant metastases were found to have cardiac involvement. The incidence of cardiac metastases has increased over the last 30 years, perhaps attributable to increased life expectancy in oncologic patients benefitting from advances in cancer diagnosis and management [3,4].

Although any type of tumor can affect the heart, the probability of cardiac involvement is a function of anatomic considerations, stage of disease, and individual tumor and host biology. Primary lung cancer represents 36% to 39% of cardiac metastases, followed by breast cancer (10% - 12%) and hematologic malignancies (10% - 21%) [1,4,6]. These numbers reflect the high prevalence of these tumors in the general population and their aggressive nature. Pleural mesothelioma and melanoma have an unusual proclivity to involve the heart, with estimates of 28% to 56% of patients with metastatic melanoma having some cardiac involvement [1,7]. Other tumors with high rates of cardiac metastasis include ovarian, gastric, renal, and pancreatic carcinomas [1,4,6]. Cardiac metastasis from squamous cell carcinoma is rare [8,9].

Cardiac metastases are not infrequent. Although frequently clinically silent, they should always be considered in any individual with new cardiac symptoms and known malignancy. The clinical sequelae of cardiac metastases are varied and numerous, and depend on the anatomic localization of tumor involvement. Most cardiac metastases are associated with widely metastatic disease and thoracic involvement, although certain tumors such as melanoma are particularly prone to cardiac metastasis. Echocardiography is the initial imaging test for the detection of cardiac metastasis, although CMR, cardiac CT, and positron emission tomography/CT may help further characterize and delineate the extent of both cardiac and extra-cardiac disease. Treatment of cardiac metastases depends on their immediate cardiac complications, as well as the clinical context, prognosis, and functional status of the patient.

Conclusion

This case illustrates the importance of developing a broad differential diagnosis when a patient presents with chest pain and ECG changes mimicking an acute coronary syndrome. Initial evaluation of the patient with echocardiography will facilitate the understanding of the underlying etiology of the patient's symptoms and ECG findings. The outlined clinical course also demonstrates that multimodality imaging allows surveillance of the patient's condition over time. A take home point is what appears to be may not always be and simulacrums of myocardial infarction are not uncommon in clinical medicine.

Disclosure

The authors contributed equally to the manuscript. The author(s) declare that there is no conflict of interest regarding the publication of this paper.

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