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Cardiac Tumor Masquerading as ST Elevation Myocardial Infarction: A Case Report and Literature Review

Kang Xiang, Prashant D Bhave, S Patrick Whalen and Matthew J Singleton*

Department of Internal Medicine, Wake Forest School of Medicine, USA

Correspondence should be addressed to Matthew J Singleton, mjsingle@wakehealth.edu

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ABSTRACT

Cardiac tumors are rare, with primary tumors much rarer than secondary. They can present with a variety of symptoms, including cardiogenic shock, arrhythmias, tamponade, and systemic embolism. There have been cases reported of patients having cardiac tumors presenting with ST elevations. While the exact pathophysiological mechanism for ST changes in patient with tumors is not known, proposed theories include tumor emboli to coronary artery, external compression of coronary arteries, stretching of cardiac muscle fibers, inflammatory reactions, and electrolyte transfer from necrotic tumor tissue to adjacent myocardium. We present a case in which the patient had no prior history of malignancy that are presented with cough, shortness of breath, lower extremity edema, ST elevation on electrocardiogram, and was found to have epithelioid tumor in his left ventricle. This case raises awareness of wide differential for ST changes on electrocardiogram besides myocardial infarction, especially in patients who do not present with classic ischemic symptoms.

KEYWORDS

Cardiac tumor, ST elevation

1. INTRODUCTION

Cardiac tumors are rare. In one study of 12,000 autopsies performed over a 20 year period, primary and secondary cardiac tumors were found in 7 and 154 patients, making up 0.056 and 1.23 of the autopsies [1]. Some cardiac tumors are slow growing and only found incidentally, while others can present with a wide variety of symptoms, including obstruction of blood flow leading to heart failure, local tissue invasion leading to arrhythmia or tamponade, embolization to other parts of body, and systemic symptoms [2]. Arrhythmia is described as an infrequent finding. In one retrospective study in 1969 with 26 people who had metastatic cardiac tumors, only 5 patients had ectopic rhythm, and 3 others had sinus tachycardia. ST segment changes were rare: 4 people had ST depression and none with ST elevation [3]. There have been numerous other isolated case reports of patients with cardiac tumor presenting with ST elevation. Most of the patients either had prior cancer in other areas of the body or presented with chest pain or discomfort. We present a case in which the patient had no prior history of malignancy that are presented with cough, shortness of breath, lower extremity edema, ST elevation on

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electrocardiogram (ECG), and was found to have epithelioid tumor in his left ventricle.

2. CASE PRESENTATION

A 66-year-old man had been having nonproductive cough for 6 weeks and was treated for bronchitis by his primary care physician with antibiotics and antihistamine. His cough did not improve with treatment, and he began having lower extremity edema over the preceding week, with associated dyspnea at rest. He presented again to his internist's office and was found to have enlarged cardiac silhouette with bilateral infiltrates on chest radiograph. ECG in office showed ST elevation in leads II, III, aVF, and V3-V6 (Figure 1), are concerning for acute myocardial infarction. He denied chest pain. He was given aspirin and sent to the emergency department.

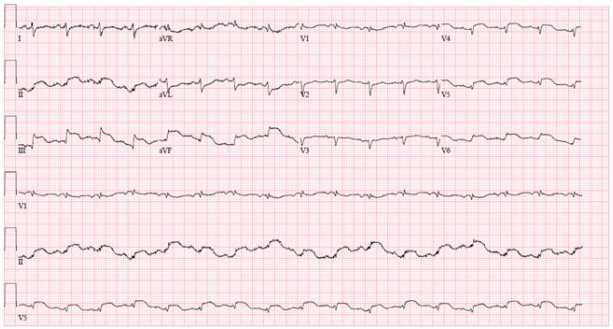

Figure 1: Initial ECG showing sinus rhythm with acute ST elevation in V4-6, II, III, aVF.

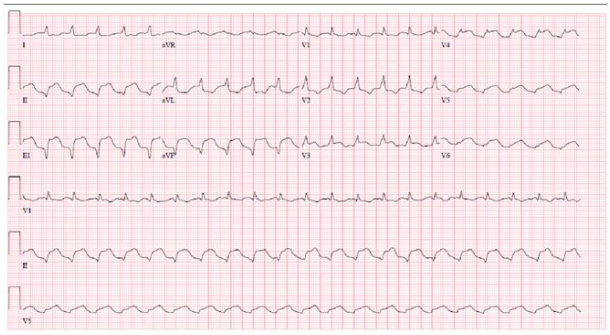

Figure 2: Evolving ECG changes showing widening of QRS in anterolateral leads and developing bundle branch block.

His initial vitals showed temperature 98.7˚F, heart rate 92, blood pressure 135/89, respiratory rate 14, and oxygen saturation 94%. He was breathing comfortably without chest pain, diaphoresis, or dyspnea. Physical exam was significant for lower extremity edema. ECG in the Emergency Department confirmed ST elevation in inferior and lateral leads (Figure 2).

Initial troponin was <0.03. Other laboratory values were normal. In light of his ST elevations, he was taken emergently to the cardiac catheterization laboratory. Coronary angiography demonstrated no obstructive coronary artery disease. However, it was noted that multiple fistulae connected the epicardial coronary arteries to the left ventricular (LV) cavity (Figure 3). Ventriculogram showed diminished LV function. Bedside echocardiogram showed apical thrombus, poor LV function, and findings consistent with elevated pulmonary artery pressures. Swan Ganz catheter confirmed high pulmonary wedge pressure at 61 mmHg, systolic pulmonary artery pressure at 53 mmHg, and right ventricular pressure of 57 mmHg. While in the catheterization laboratory, he became progressively more tachycardic and dyspneic, eventually requiring intubation. He initially required pressor support with both epinephrine and norepinephrine. Further hemodynamic deterioration led to placement of an intra aortic balloon pump; eventually he required extracorporeal membranous oxygenation support. Repeat echocardiogram showed severely depressed LV ejection fraction, pericardial effusion, and dilated left atrium. Computed tomography (CT) of chest, abdomen, and pelvis (Figure 4A & Figure 4B) revealed anterior bulging of the left and right ventricles, suspicious for ventricular aneurysm versus mass, many pulmonary nodules involving all lobes concerning for septic or tumor emboli, and mediastinal and hilar lymphadenopathy. CT of the head with contrast revealed multiple hypo densities, consistent with age indeterminate infarcts. Further infectious workup was unrevealing, including Epstein Barr virus, enterovirus, herpes simplex virus, parvovirus B19, and human herpesvirus 6. His cardiac mass was percutaneously biopsied by interventional cardiology using a bioptome.

He also underwent percutaneous drainage of his pericardial effusion, with cytology showing rare atypical cells suspicious for malignancy. Pathology from biopsy showed likely sarcoma. Oncology was consulted and anticipated him to be a poor candidate for systemic chemotherapy given critical clinical status and likely poor chemosensitivity of his malignancy. He later developed acute renal failure. Given his poor prognosis without available intervention, his family decided to make him comfort care and withdraw interventions. He died on hospital day 14. Final pathology result showed high grade malignant spindle and epithelioid neoplasm.

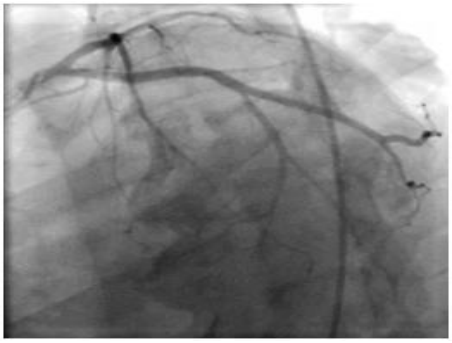

Figure 3: Coronary angiogram demonstrating no obstructive coronary artery disease.

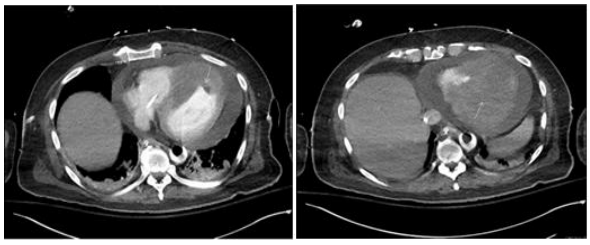

Figure 4a & 4b: CT chest showing large pericardial effusion, massive left ventricle filling defect, and anterior bulging of the left ventricle along right ventricular apex.

3. DISCUSSION

We present a case of a patient presenting with ST elevation who was subsequently found to have epithelioid tumor growing in his left ventricle. He also had multiple pulmonary nodules with hypo densities on head CT. The source of the cardiac tumor was not known, but it is suspicious for a non-cardiac primary tumor given radiographic evidence of metastases. There have been several case reports of cardiac tumors presenting with ST changes. One of the earliest cases was reported in 1942, describing a 53-year-old man with history of esophageal cancer who presented with chest pain and was found to have inferior ST elevation and T wave inversion that persisted until his death three months later [4].

Another case in 2007 reported a 73-year-old woman who presented with progressive fatigue but no chest pain who was found to have hypercalcemia with anterolateral ST elevation without troponin elevation. Echocardiogram showed a mass in LV with myocardial invasion found to be metastatic squamous cell carcinoma of lung [5]. In 2015, Nakashima et al. [6] reported a 73-year-old man with history of urothelial carcinoma who presented with ST elevation and was found to have a cardiac mass in his right ventricle. More recently in 2018, a 59-year-old male with history of tongue squamous cell carcinoma status post resection who presented with chest pain was found to have anterior leads ST elevation and negative troponin as result of metastatic tumor in the right ventricle [7]. In nearly all of the aforementioned cases, the patient had extremely poor prognosis and passed away soon after diagnosis.

Our case is unique in two ways. First, our patient is previously healthy and had no significant medical history or risk factors. Unlike many of the aforementioned cases, our patient had no prior history of cancer. With radiographic evidence of metastases, he likely had non-cardiac primary tumor with cardiac invasion. Secondly, the patient did not have any chest pain on presentation. His initial shortness of breath, lower extremity edema, and large cardiac silhouette on X-ray, coupled with recent upper respiratory symptoms made cardiomyopathy high on the differential. His abnormal ECG was the first clue that led to his diagnosis. With non-obstructed coronary arteries and negative initial troponin, it is likely patient did not have cardiac infarction.

Numerous other medical conditions have been known to mimic ECG changes similar to those seen in STEMI. Some notable ones include pericarditis, acute pancreatitis, hyperkalemia, Brugada syndrome, Takotsubo cardiomyopathy, bundle branch block, Prinzmetal angina [4]. Unfortunately, our patient had no prior ECG for comparison to see if he had ST abnormality at baseline. It is possible he could have had a slow growing tumor with slowly evolving ECG changes for many months and only presented at very late stage. The exact cause of ST changes on ECG in cardiac tumor is unknown. Some of the theories include tumor emboli to coronary artery, metastatic lesion compressing coronary arteries, and tumor invasion into myocardium [7]. Some suggested mechanisms specific for tumor invasion includes stretching of cardiac muscle fibers from tumor burden, inflammatory reactions, electrolyte transfer from necrotic tumor tissue to adjacent myocardium [8,9]. It is difficult to study the exact mechanism due to rarity and very late presentation of the illness. Our case highlights two learning points. First, there are numerous other medical conditions that can mimic ECG changes similar to those seen in STEMI. It's important to consider alternative diagnosis in patients who presented with atypical symptoms. Second, cardiac tumor is rare but is one of the medical conditions that can present similarly to an acute myocardial infarction.

4. CONCLUSION

This report presents a case of patient who presented with cough, lower extremity edema, shortness of breath, and ST elevations on ECG who was found to have epithelioid tumor in his LV. He had no prior history of cancer and did not present with any chest pain. This case raises awareness of wide differential for ST changes on ECG. It is especially important for physicians to consider alternative etiologies of ST elevations in patients without classic cardiac symptoms.

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