

## Unusual echocardiographic finding as cause of acute coronary syndrome with ST- segment elevation

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### Abstract

Biventricular metastatic heart tumors from gynecological malignancies presented as an acute coronary syndrome with ST segment elevation are an unusual finding. We present a case of stage-4 vulvar carcinoma that metastasized in both the left and right ventricle. The particularity of the case is the echocardiographic aspect in the emergency room: multiple, large, hyperechogenic masses disseminated in the myocardium, with pericardial extension, in context of acute coronary syndrome with ST segment elevation.

**Keywords:** cardiac metastases; vulvar carcinoma; echocardiography; acute coronary syndrome; ST segment elevation.

### Introduction

Coronary occlusion due to atherosclerosis is the leading cause of ST-segment elevation myocardial infarction (STEMI). But there are other potential causes of acute coronary syndromes (ACS), among which cardiac metastases (CMT) [1]. Primary heart tumors are very rare [1,2] but secondary heart tumors (metastases) are far more common [2]. CMT may present with a wide spectrum of cardiac symptoms and signs, usually with right-sided heart failure symptoms. They can also mimic cardiac ischemia due to invasion, compression or embolism to coronary arteries [3].

Vulvar carcinoma is a rare gynecological malignancy, usually with local recurrences. Distant metastases are rare events with very limited prognosis [4]. Cardiac metastasis has been mentioned only in few case reports

[5,6], but metastasis in both ventricles and presented as an ACS with ST-segment elevation were not reported.

In this case report, we describe a patient with stage-4 vulvar carcinoma presented as ACS with lateral ST-segment elevation, with metastases in both ventricles and with pericardial invasion.

### Case report

A 68-year-old white female, without previous cardiovascular history, was admitted from the Oncology Department for chest pain started 2 hours prior admission.

The patient was diagnosed 9 months ago with vulvar keratinizing squamous cell carcinoma, well differentiated (G1), without metastases at that moment. She underwent chemotherapy based on Paclitaxel and Carboplatin, followed by total vulvectomy with bilateral inguinal lymphadenectomy and adjuvant external radiotherapy, with good evolution for almost 7 months. In the last month she was diagnosed with metastases in lungs, pleura, liver, retroperitoneum, left adrenal gland, bone, lymph nodes and muscles. She was hospitalized to start palliative chemotherapy.

In the emergency room the electrocardiogram (ECG) showed sinus rhythm, 1-4 mm ST segment elevation (STE) in leads DI, aVL, V3-V6 (Supplementary fig 1).

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The maximum serum cardiac troponin levels were 0.189 ng/ml (normal values <0.014 ng/ml), with serum creatine kinase isoenzyme-MB within normal limits.

The transthoracic echocardiography (TTE) showed multiple large heterogenous masses involving the apex and the anterolateral wall of the left ventricle, which appeared to invade the pericardium, the free wall of the right ventricle (of about 50/42 mm) and moderate pericardial effusion (~15 mm) (fig 1, Video 1 on the journal site). The left ventricle was non-dilated and had preserved ejection fraction.

Due to the high suspicion of cardiac metastases, an urgent cardiac computed tomography (CCT) was ordered. It demonstrated multiple cardiac masses, with a confluent appearance at the apex and anterolateral wall of the left ventricle and antero-inferior wall of the right ventricle, with a maximum size of 54/43 mm and with pericardial invasion (fig 2, Video 2 on the journal site).

An urgent coronary angiography was performed, with no evidence of coronary atherosclerosis; the distal occlusion of the marginal coronary artery had no indication for coronary stenting.

Considering the extent of the patient's metastatic disease (intracardiac and extracardiac) surgical resection of the cardiac masses was not considered.

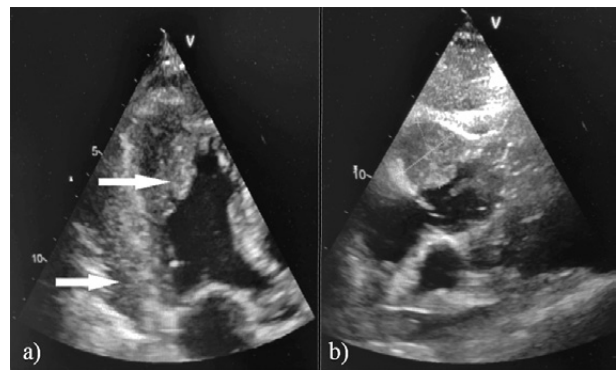
During our observation the patient developed paroxysmal atrial fibrillation (Supplementary fig 2). The cardiological treatment was with amiodarone, beta-blocker and direct oral anticoagulant. At 2 weeks, the ECG showed sinus rhythm with persistent lateral STE (Supplementary fig 3) and the TTE had the same aspect (fig 3, Video 3 on the journal site). The evolution was unfavorable with the decease of the patient one month later.

## Discussion

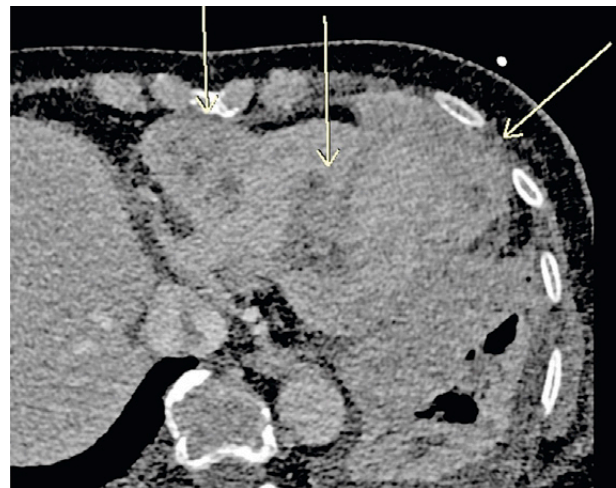
We report a rare case of vulvar carcinoma metastasizing to heart and pericardium, which was characterized by TTE, presented as a lateral ACS with ST-segment elevation on the ECG, with elevated high-sensitive troponin T (more than 10 times normal value, without variation during observation) and with normal serial creatine kinase-MB isoenzyme.

TTE is the initial test of choice in the workup used in the Emergency room for patients with ACS, to exclude other possible causes of chest pain. Rarely, STE can develop in other clinical settings except ACS, such as metastatic myocardial infiltration.

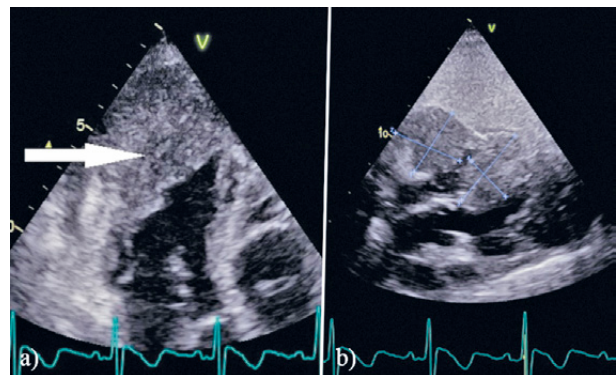
TTE is the first imaging method recommended to detect and monitor cardiac tumors because of its low cost, wide availability, and lack of radiation exposure [7]. Metastatic tumors can be differentiated from primary car-



**Fig 1.** Transthoracic echocardiography: a) apical 3 chamber view – large heterogenous mass in the lateral left ventricular wall with pericardial extension and moderate pericardial effusion (arrows); b) subcostal view – one of the largest metastases in the right ventricle of about 5/4.2 cm.



**Fig 2.** Cardiac computer tomography. Metastases involving the apex of left ventricle, antero-inferior wall of the RV and interventricular septum (arrows).



**Fig 3.** Transthoracic echocardiography at 2-weeks follow-up: a) apical 3 chamber view shows large cardiac metastases in the left ventricle apex and lateral wall, with pericardial invasion (arrow); b) subcostal view: two giant metastases (5/5.1 cm and 6/3.5 cm) in the right ventricle wall.

diac tumors using TTE: epicardium is the most common site for secondary heart tumors and they have irregular surface. Other characteristics are the presence of pericardial effusion and direct invasion of the myocardial walls. Transesophageal echocardiography, especially using 3-dimensional techniques, can provide a clearer description of intracardiac tumors [8], but it is rarely needed. CCT and cardiac magnetic resonance imaging (MRI) help in accurately determine the size and extension of the tumor mass, but are not as available and easy to be performed as TTE. The exact diagnosis can only be established by anatomopathological examination [7].

The clinical manifestations of CMT are nonspecific and depend on their location and primary tumor burden [2]. The epicardial or myocardial metastases may result in a variety of life-threatening complications, such as ACS with ST-segment elevation or new onset atrial fibrillation with rapid ventricular conduction, as was the case of our patient. In 2020 a first study systematically demonstrating common STE patterns in patients with CMT [2] was published, which can predict the localization of CMT in the cardiac tissue. The STE is persistent and may reflect an ongoing injury current between the infiltrated and normal myocardium.

Gynecological malignancies have very rarely been associated with cardiac metastases. To our knowledge there are few case reports in literature describing cardiac metastases from vulvar carcinoma to the heart [4-6]. Several case reports have been published with ST-segment changes in context of cardiac tumors [9,10], though the precise pathophysiological mechanism behind the ECG changes continues to be debated [2].

The major limitation of the presented case was the inability to obtain pathological confirmation of the metastatic origin of the cardiac masses. Due to widespread

of the disease and poor prognosis, we did not consider that a pathological exam would change the patient management.

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## Captions for the videos uploaded to the journal site

**Video 1.** Echocardiography in the emergency department: apical 4 chamber view.

**Video 2.** Cardiac computer tomography. Multiple hypoattenuating metastases with involvement of the myocardium, right pulmonary hilum, bilateral pleura and left inferior pulmonary lobe.

**Video 3.** TTE, apical four-chamber view at 2-weeks follow-up. Large cardiac metastasis in the apex and lateral wall of the left ventricle, with pericardial invasion.