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Enigma of Huge mass filling the apical wall of the left ventricle. Is it thrombus, tumor or endomyocardial fibrosis?

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Abstract:

Background: Cardiac masses have a wide range of etiologies with the most common being thrombi and less commonly tumors. Certain areas of the heart have specific tumor predilections. We present an interesting case in which the diagnosis of the ventricular mass was difficult given the initial symptomatology and the patient's phobia.

Case summary: A 45-year-old male patient with medical history of smoking, was admitted to the emergency room complaining of severe breathlessness, However, the patient declined any chest discomfort or pain.

On physical examination he was dyspneic, with vital signs revealed heart rate of 110 beats/min, blood pressure of 125/90 mmHg. Cardiovascular examination showed regular heart rhythm and normal heart sounds.

Electrocardiogram revealed sinus tachycardia, chest X-ray was suggestive of cardiomegaly.

Transthoracic Echocardiography demonstrated a dilated left ventricle with severely reduced ejection fraction and diffuses kinetic disturbances. The presence of a huge mass filling the apical wall of the left ventricle, hyperechogenic in appearance and very adherent to the ventricle.

In front of this doubtful appearance at the echocardiography the patient was programmed for a cardiac magnetic resonance imaging which could not be carried out because of the claustrophobic state of the patient.

In the meantime, the patient had a cardiac arrest due to refractory ventricular fibrillation successfully resuscitated. In front of this complication, he benefited from an automatic implantable defibrillator as a secondary prevention.

Subsequently, a coronary angiography was performed in the context of the patient's smoking habits and kinetic disorders, to our surprise showed a complete occlusion of the left anterior descending artery knowing that the patient is not diabetic and he never complained of any painful symptomatology, primary coronary intervention was successfully performed to the left anterior descending artery.

The patient was started on therapeutic anticoagulation and heart failure therapy. Follow-up imaging after 6months showed a significant improvement of the left ventricular systolic function and thrombus regression to apical segment without embolic events.

Conclusion: The diagnosis of a ventricular mass remains difficult, the orientation can be done initially by the ground of the patient while being helped by the transtoracic echography and the multimodality imagery at the end to specify the nature of the intra-cardiac mass for an adequate and fast management.

Keywords: Thrombus, ventricular mass, coronary angiography, heart failure, oral anticoagulation.
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Introduction:
When an intracardiac mass is detected, thrombus is often the first diagnostic question; it can be rapidly fatal if left untreated.

Cardiac masses have a wide range of etiologies with the most common being thrombi and less commonly tumors. Certain areas of the heart have specific tumor predilections. primary Left ventricular tumors include rhabdomyomas, lipomas, and fibromas. secondary metastases can reach the heart by different routes.
We present an interesting case in which the diagnosis of the ventricular mass was difficult given the initial symptomatology and the patient's phobia.

Case report:
A 45-year-old male patient with medical history of smoking, was admitted to the emergency room complaining of severe breathlessness on exertion in the past 6 months and aggravated 2 days prior to admission, NYHA (New York Heart Association) grade III. However, the patient declined any chest discomfort or pain, no recent cough or fever, and no history of anginal pain.
On physical examination he was dyspneic, with vital signs revealed heart rate of 110beats/min, blood pressure of 125/90 mmHg, oxygen saturation of 99% on room air, and respiratory rate of 23breaths/min. He appeared fatigued. Cardiovascular examination showed regular heart rhythm and normal heart sounds. On lung auscultation, bilateral diffuse pulmonary crackles were present.
Electrocardiogram revealed sinus tachycardia with left axis deviation, left anterior fascicular block and poor R-wave progression, chest X-ray was suggestive of cardiomegaly.
Transthoracic Echocardiography demonstrated a dilated left ventricle with severely reduced ejection fraction (EF of 30%) and diffuses kinetic disturbances. The presence of a huge mass filling the apical wall of the left ventricle, hyperechogenic in appearance and very adherent to the ventricle, suspicious of an apical thrombus (figure 1)

Figure 1A

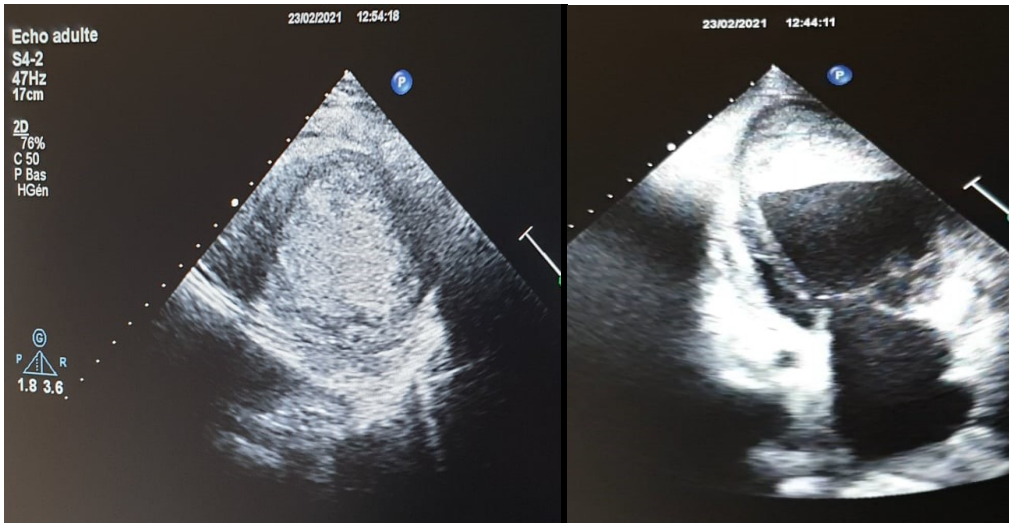

Figure 1B **Figure 1C**

Figure 1 :
A & B*: Apical four-chamber and apical two-chamber views of the transthoracic echocardiography demonstrating a large echogenic apical mass suspicious of an apical thrombus.*
C: *Short-axis view of the Transthoracic echocardiography showing left ventricle filled with thrombus.*

In front of this doubtful appearance at the echocardiography the patient was programmed for a cardiac magnetic resonance imaging which could not be carried out because of the claustrophobic state of the patient (three achievement failure).
In the meantime, the patient had a cardiac arrest due to refractory ventricular fibrillation (VF) successfully resuscitated. In front of this complication, he benefited from an automatic implantable defibrillator as a secondary prevention.
Subsequently, a coronary angiography was performed in the context of the patient's smoking habits and kinetic disorders, to rule out ischemic cardiomyopathy and therefore a possible thrombus, while keeping the patient on heparin as a test and preventive treatment. The coronary angiography to our surprise showed a complete occlusion of the left anterior descending artery (figure 2), knowing that the patient is not diabetic and he never complained of any painful symptomatology, primary coronary intervention was successfully performed to the left anterior descending artery.

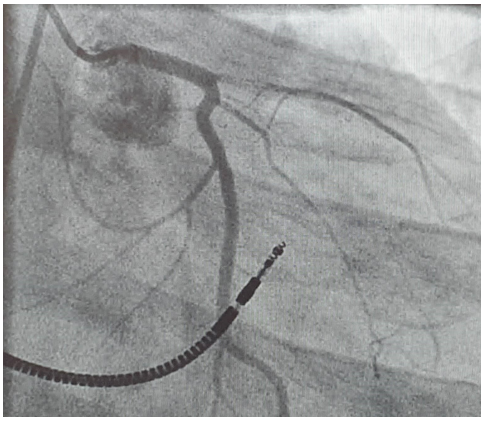

Figure 2: *coronary angiography : RAO view illustrates the left coronary artery with a significant occlusive lesion in proximal portion*

The patient was started on therapeutic anticoagulation and heart failure therapy. Follow-up imaging after 6 months showed a significant improvement of the LV systolic function and thrombus regression to apical segment without embolic events.

Discussion:

Clinical suspicion for a cardiac mass is often prompted by patients with known risk factors for intracardiac thrombosis. Suspicion may also be prompted by symptoms suggestive of a cardiac mass. The symptoms a cardiac tumor causes are usually related to its cardiac location, although some may produce systemic complaints. Embolic phenomena are an example of the latter and may be the clinical first presentation of the tumor. Most commonly, these are noted in the systemic circulation as tumors on the left side of the heart are associated with a greater risk of embolization, but tumor embolism into the pulmonary circulation has been described as well [1,2].

Hemodynamically, tumors reduce stroke volume by causing intra-cavity obstruction or valvular dysfunction. Malignant tumors may invade the myocardium and pericardium resulting in arrhythmias, heart failure and pericardial effusions. Sudden death may also occur, and although infrequent, it can unfortunately be the initial and final manifestation of the tumor [3].

In general, early identification of a cardiac tumor is ideal for treatment considerations and prognosis. Primary cardiac tumors tend to be benign (80%) with the most common being the cardiac myxoma. Previous reports suggest that these tumors make up 50–90% of primary cardiac tumors. Certain areas of the heart have specific tumor predilections. Primary tumors of the left atrium are predominantly myxomas and lipomas, while primary Left ventricular tumors include rhabdomyomas, lipomas, and fibromas [12].Patients with known primary cancer who experience new cardiac complaints, such as obstructive symptoms or arrhythmia, should subsequently be evaluated for metastatic disease.

Metastatic involvement of the heart may occur through 4 mechanisms: hematogenous spread, lymphatic spread, transvenous extension, and direct invasion [4]. Hematogenous spread occurs when malignant cells disseminate in the bloodstream and deposit in cardiac tissue, and is typically seen in patients with malignant melanoma, lymphoma, and leukemia. Lymphatic spread is likely the most common route of spread to the heart, based on the fact that lung cancer and breast cancer account for the majority of the cardiac tumor burden. More specifically, this mechanism primarily occurs through retrograde propagation of mediastinal lymphatics, resulting in implantation of malignant cells in the epicardium and pericardium. Transvenous spread occurs when the tumor propagates along venous channels leading to the heart. In particular, infradiaphragmatic cancers, such as hepatocellular carcinoma, renal cell carcinoma, and adrenal adenocarcinoma, may ascend the inferior vena cava and enter the right atrium, leading to intracardiac involvement. Lastly, direct spread of cancer to the heart can occur, especially in patients with adjacent thoracic malignancies, due to their proximity to the heart, such as lung cancer, breast cancer, esophageal cancer, and malignant pleureal mesothelioma [5].

The initial imaging test of choice is transthoracic echocardiography (TTE) due to its non invasive nature and widespread availability. On echocardiography thrombi have increased echogenicity compared to local tissue and well-delineated borders with or without adhesion to the endocardium. When diagnostic doubt concerning the tumor remains after TTE, a transesophageal echocardiogram (TEE) can be performed to enhance visualization of the mass itself as well as presence or absence of attachment to cardiac tissue and mobility of the mass [6]. cardiac magnetic resonance imaging (MRI) can be utilized after echocardiography to further characterize cardiac masses due to its superior tissue characterization and higher contrast resolution [6] Cardiac MRI is the most accurate imaging method with respect to differentiation of cardiac thrombi from tumor [7].This distinction can be enhanced through the use of specific MRI protocols, especially contrast-enhanced sequences, as thrombi are avascular and typically do not enhance. In particular, delayed enhanced sequences on cardiac MR I appear to be most useful for thrombus detection [7].The appearance of a thrombus is largely dependent on its age.

Cardiac metastases most often affect the right side of the heart [8].Low signal intensity on T1-weighted sequences and high signal intensity on T2-weighted sequences are typical of cardiac metastasis. Melanoma is an exception to this notion, as its paramagnetic properties instead lead to high intensity on both T1- and T2-weighted imaging [9]. In general, most tumors demonstrate enhancement and heterogeneous uptake of contrast. Involvement of the pericardium is common, and can lead to development of a malignant pericardial effusion. This exudative effusion demonstrates intermediate to high signal intensity on T1-weighted images, as opposed to the low signal intensity seen with benign transudative effusions.

Differentiating between thrombi and tumor may be difficult without formal biopsy, but several key features have been identified to assist the clinician. Features that favor thrombi include history of smoking, electrocardiography suggestive of previous anterior wall myocardial infarction, and presence of a wall motion abnormality on echocardiography [5]. Risk factors that suggest tumor include no history of atherosclerotic cardiovascular disease and family history. Features that suggest tumor on echocardiography include mass density akin to myocardial tissue and attachment to the anterior wall. [6].

We must not forget to mention endomyocardial fibrosis (EMF) which iis a form of cardiomyopathy characterised by fibrosis and thickening that distinctly involves the ventricular apex and walls. It is one of the common causes of restrictive cardiomyopathy and is frequently underdiagnosed and occasionally mislabelled as rheumatic valvular disease or hypertrophic cardiomyopathy [10]. On echocardiography, endomyocardial thickening and fibrosis of the apex, ventricular walls, and papillary muscles, with possible progression to fibrous obliteration of the right ventricular or left ventricular apex are frequently seen [11]. Recently, MRI emerged as an additional tool to define the primary and secondary structural and functional abnormalities of EMF. MRI with gadolinium enhancement seems ideally suited to diagnose this condition and monitor response to medical and/or surgical therapy [11].

Our patient was managed in the intensive cardiology care of our training, heart failure was controlled and the patient benefited from a coronary angiography showing an occlusion of the left anterior descending artery (figure 2) with percutaneous angioplasty and stent placement with good evolution.

The evolution was highlighted by decreasing of size of the apical thrombus under oral anticoagulation by vitamin K antagonists (VKA).

There is limited data on the efficacy of direct oral anticoagulants (DOACs) for the treatment of left ventricular thrombus. Currently, VKA remain the preferred oral anticoagulant for left ventricular thrombus. The retrospective observational Study of Raviteja et al [13] assessed the safety and efficacy of DOACs in comparison to VKA in patients with a new diagnosis of left ventricular thrombus.

Conclusion:

The diagnosis of a ventricular mass remains difficult; the orientation can be done initially by the ground of the patient while being helped by the transtoracic echography and the multimodality imagery at the end to specify the nature of the intra-cardiac mass for an adequate and fast management.

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CONFLICT OF INTERESTS

The author declares no conflict of interest.