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Case Report

Metastatic obliterating mass of right ventricular cavity: A report of case and echocardiographic features



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ABSTRACT

We present the case of a 63-year-old man with a history of non-small cell lung carcinoma (NSCLC) and systemic chemotherapy who suffered from progressive shortness of breath and peripheral edema. Transthoracic echocardiography showed a huge non-homogenous mass nearly completely filling the dilated right ventricle. The border of mass was not differentiable from the right ventricular myocardium. The findings of echocardiographic study were highly suggestive for cardiac metastasis. Computed tomography and positron emission computed tomography confirmed the presumed diagnosis.

Lung cancer is one of the most common primary tumors of cardiac metastasis and NSCLC accounts for about 85% of all lung cancers. Lymphatic spread or direct invasion usually involves the pericardium or epicardium. However, metastasis to the myocardium and endocardium is extremely rare.

The huge size, location, direct invasion to myocardium and echocardiographic features of this cardiac mass have made it a unique case for presentation.

<Learning objective: Despite the versatility and high accuracy of cardiac computed tomography (CT), magnetic resonance imaging, and 18-fluorodeoxyglucose positron emission CT, echocardiography remains the modality of choice for the initial evaluation and follow-up examinations of cardiac masses. Although echocardiography is limited in regard to tissue characterization and characterization of extra cardiac structures, this image modality is widely accessible without relevant side effects, and allows the assessment of hemodynamic consequences of cardiac masses involving the myocardium valves, or pericardium.>

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Introduction

In the heart, metastatic tumors are more common than primary malignant tumors. Lung cancer is one of the most common primary tumors of cardiac metastasis. They can be found incidentally or diagnosed as a result of patients' symptoms or clinical suspicion [1,2].

Despite the increasing availability of cardiac computed tomography (CT) and magnetic resonance imaging (MRI) in clinical routine, echocardiography is the initial imaging tool applied for identifying and characterizing cardiac masses, including the location, size, mobility, hemodynamic consequences, and differentiating extra-cardiac disease.

Case report

A 63-year-old man was admitted to our hospital due to progressively increasing shortness of breath and peripheral edema. He had been diagnosed with non-small cell lung carcinoma (NSCLC) and had received two cycles of chemotherapy.

On physical examination, he was fully oriented with a cachectic and ill appearance with blood pressure 87/60 mmHg and heart rate 83 beats per minute, increased jugular venous pressure, right parasternal heave, muffled heart sounds, mildly palpable liver span, and peripheral edema.

He had no history of cardiovascular disease and his echocardiographic evaluation before starting chemotherapy was unremarkable. Six months after the initial diagnosis, the follow-up transthoracic echocardiogram (TTE)-using two- and three-dimensional methods (2D and 3D) showed a severely dilated and dysfunctional right ventricle (RV) occupied by a huge (10 × 7.4 × 5 cm), non-homogenous, and lobulated mass. The

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border of mass was not differentiable from the right ventricular wall (Fig. 1A–C) and RV ejection fraction (RVEF), fractional area change, myocardial strain, and tricuspid annular plane systolic excursion (TAPSE) were severely depressed (8%, 3.5%, 2%, and 1 mm respectively) (Fig. 1D). Although the mass filled nearly the entire RV cavity, the RV outflow tract was not compromised and the main pulmonary arteries including branches were mass free (Fig. 2A, B). The mass had irregular free borders at the basal part of RV with no invasion into tricuspid valve (Fig. 2C, D). The left ventricle showed a normal size and preserved systolic function. There was a mild circumferential pericardial effusion.

Differential diagnosis included tumor and/or thrombus. Cardiac CT with and without contrast was performed. Similar to the TTE it showed a large mass in the RV attached to the myocardium occupying almost the entire RV cavity with intermediate contrast enhancement (Fig. 3A). 18-Fluorodeoxyglucose positron emission CT (^{18}F -FDG PET/CT) showed intense hyper metabolic activities in primary lung cancer, mediastinal lymph nodes, and the RV of the heart (Fig. 3B). The ^{18}F -FDG PET/CT features were consistent with tumorous metastatic

involvement of the RV. The case was discussed in our multidisciplinary tumor board and it was decided to administer palliative chemotherapy. However, the patient expired due to cardiorespiratory failure after two months.

Discussion

Although primary cardiac tumors are extremely uncommon (reported incidence $\sim 0.02\%$), the heart is not a rare target of metastasis of malignant tumors. Metastatic tumors are 20–40 times more common than primary tumors [1,2].

Lung cancer is the most common primary tumor of cardiac metastasis (35–40%) [1–3]. NSCLC accounts for about 85% of all lung cancers and adenocarcinoma is the most frequent cell type [2].

Certain characteristics identified on various imaging modalities may help to distinguish benign from malignant masses [3].

We report the case of a patient with a NSCLC metastasis to the RV walls and cavity which was initially diagnosed by echocardiography and further characterized by ^{18}F -FDG PET/CT.

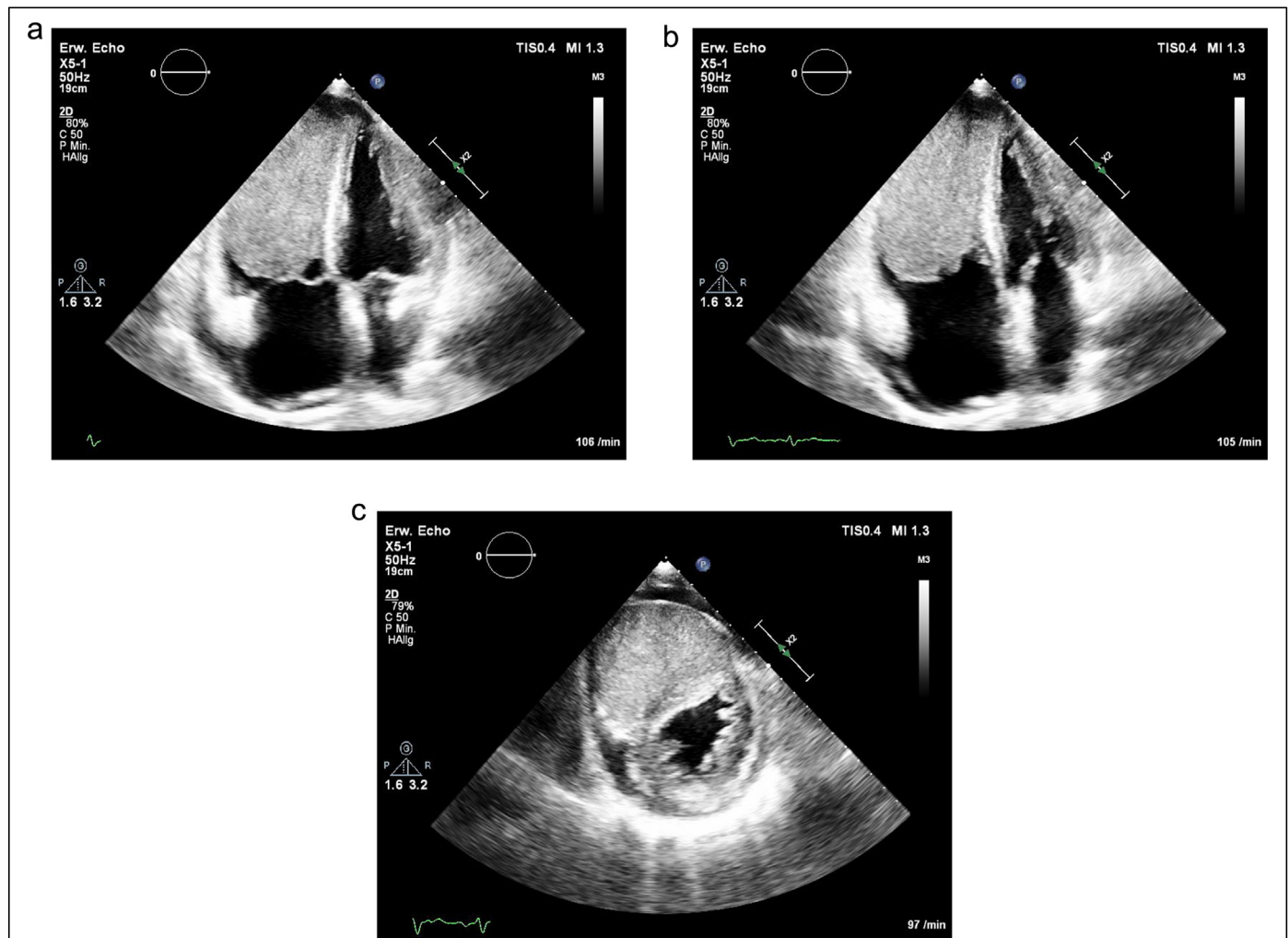


Fig. 1. The apical 4-chamber view in transthoracic echocardiography (TTE) shows a huge mass occupying most of the right ventricular (RV) cavity in systole (A) and diastole (B). (C) The parasternal short-axis view in TTE shows a large mass occupying the RV. The border of mass is not differentiable from the RV wall. (D) Echocardiographic evaluation of volumes and systolic function of RV using three-dimensional cardiac performance analysis (TomTec Imaging system, Unterschleissheim, Germany) shows a severely dilated and dysfunctional RV.

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