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Case Report

Unusual mass in the heart: A case report [☆]

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ABSTRACT

Carcinoma lung is a concerning cause of mortality worldwide. Approximately half of the cases are metastatic at diagnosis and uncommon metastatic sites confer a worse prognosis. Intracardiac metastasis from lung cancer is rare and limited to a few case reports.

The authors describe the case of a 54-year female with left ventricular cavity mass as one of the rarest presentations of lung malignancy. She presented to the cardiology outpatient department with a history of progressive dyspnea for the last two months. Her 2D echocardiogram showed a large heterogeneous mass in the left ventricle cavity along with gross pericardial and pleural effusion. CT guided lung biopsy revealed adenocarcinoma of the lung. The patient was started on tablet gefitinib along with other supportive therapy, while awaiting reports of next generation sequencing (NGS) for mutation analysis and immunohistochemistry. However, the patient's condition rapidly worsened and she succumbed to death within one week of hospital admission.

Cardiac metastasis is one of the rarest sites for lung cancer spread. Intracavitary metastasis as in our case is an extremely rare presentation. Treatment is not yet well defined for such cases and it carries a poor prognosis despite available therapies. This case required multidisciplinary approach with involvement of cardiologist, oncologist, pulmonologist and intensivists. Further research is required to help define better treatment options.

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Introduction

Carcinoma lung is now the second most commonly diagnosed malignancy worldwide [1]. It remains the leading cause of deaths related to cancer all over the world [2]. It is the most common lethal malignancy in men over 40 years' age and even

in women beyond 60 years' age. The median age at diagnosis of lung cancer is 65-70 years [3]. The incidence of nonsmall-cell lung cancer (NSCLC) is more common in women. Tobacco smoking is a crucial risk factor for NSCLC, as for any lung cancer, however NSCLC is also the most common lung cancer among non-smokers [4]. Very often, lung cancer is diagnosed at an advanced stage with metastasis [5]. Metastasis

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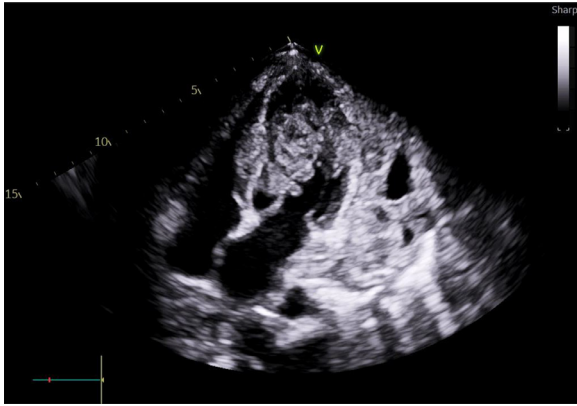


Fig. 1 – 2D echocardiogram showing space occupying mass in the left ventricular cavity and pleural effusion with similar mass lesion.

occurs most frequently to the other lung, bones, liver, brain and adrenals [6]. Pleural and pericardial metastasis may be found in advanced stages. The most common NSCLC, adenocarcinoma is known to have higher propensity for pleural metastasis owing to its peripheral location in the lung. However, intracardiac metastasis are infrequent and often asymptomatic. Presentation as a mass within the left ventricle cavity is extremely rare. Such a huge malignant mass in the left ventricle cavity is one of the rarest case reports in our knowledge. Review of literature finds that such cases are rarest of the lung cancer metastasis. Due to ignorance and lack of screening, there is delay in seeking medical attention in developing countries. Treatment is not yet well defined for such cases and it carries a poor prognosis despite available therapies. Also, it is crucial to localize the primary site of malignancy when one encounters a mass lesion inside the heart, as most often it is a metastatic spread from other organs.

Presentation of case

Our patient, a 54 years' female presented to the cardiology outpatient department with a history of progressive dyspnea for last 2 months. She also complained of orthopnea for previous 10 days. There was a history of hemoptysis and significant weight loss over this duration. She was a nonsmoker with no significant past medical history. On presentation, she was tachypneic and hypoxic with resting oxygen saturation of 88% on room air. Her blood pressure was stable while sinus tachycardia was present. Her blood counts, renal and hepatic function tests were normal. As a part of workup for her symptoms of orthopnea and breathlessness, 2D echocardiogram was performed which showed a large heterogeneous mass in the left ventricle cavity (Fig. 1). The mass measured 8.8 cm X 4.5 cm and was occupying most of the left ventricle cavity. The cardiac chambers were otherwise normal and there was no lesion at any valvular level. There was gross pleural and pericardial effusion which was drained and sent for analysis. Fluid analysis showed exudative features with cytology being

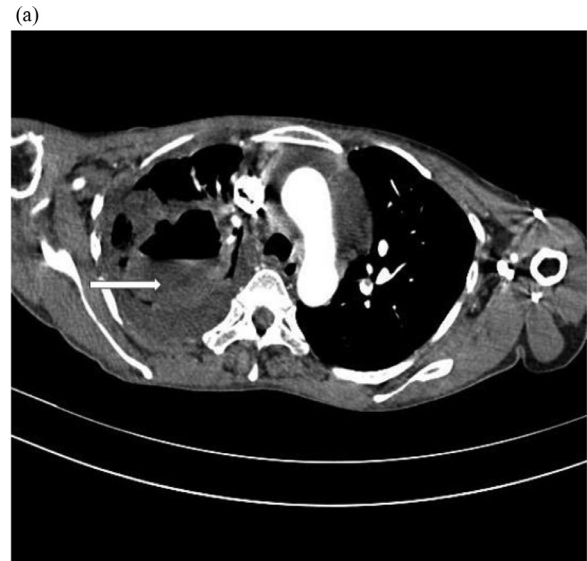


Fig. 2 – (A) CT scan of the thorax showing: Thick walled cavity with mass lesion in the upper lobe of the right lung. (B) * Hypodense filling defect in the left ventricular cavity, Pericardial effusion and White arrows depicting bilateral pleural effusion.**

negative for malignant cells. Computed tomography (CT) of the chest showed a thick walled cavity in right upper lobe (Fig. 2A). There was a hypodense filling defect in the left ventricle cavity with pericardial effusion and bilateral moderate pleural effusion (Fig. 2B). CT guided lung biopsy was done. Its histopathology revealed NSCLC (adenocarcinoma of the lung) (Fig. 3). Patient was started on tablet gefitinib along with other supportive measures and psychological counseling. She required oxygen supplementation. Specimen sample was also sent for next generation sequencing (NGS) for mutation analysis and immunohistochemistry. However, the patient's condition rapidly deteriorated and she succumbed to death within seven days of hospitalization. NGS reports collected later showed that no pathogenic mutation was detected in

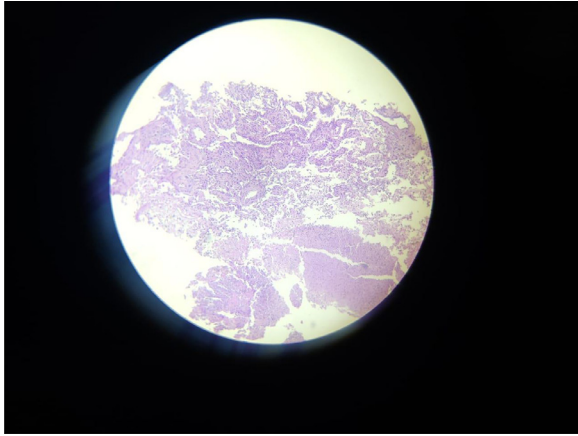


Fig. 3 – Histopathology specimen in hematoxylin and eosin stain with 10X magnification revealing features of adenocarcinoma of the lung.

EGFR, MET, BRAF and ALK (SNVs) genes. Immunohistochemistry for ALK and ROS1 proteins was also negative.

Discussion

Carcinoma lung being diagnosed by a cardiologist as left ventricle cavity mass is rare. It is unusual to find any metastatic mass inside the left ventricle cavity. The differential diagnosis of left ventricle cavity mass is usually a clot or a thrombus in an appropriate clinical setting. Malignancies involving the heart are most commonly metastatic. Almost 30%-40% of cardiac metastasis are from the lungs [7]. Apart from direct spread from the lungs, there may be hematogeneous spread from renal, liver or uterine cancers. Metastatic spread to the heart involves the pericardium and pericardial fluid, however spread to a cardiac chamber, especially the left ventricle is unusual. As with our patient, the cardiac metastasis may be symptomatic, however most commonly they are asymptomatic and detected as an incidental finding. Prognosis of patients with intra cardiac metastasis is poor [8]. Our patient had metastatic disease at presentation, which confers a worse prognosis. Due to lack of awareness, there is delay in seeking medical attention, especially in developing countries. Our patient was hypoxic and in cachexic state at the time of first medical contact. Fortunately, she could directly seek advice with specialists and was immediately hospitalized in intensive care unit. However, she rapidly succumbed to death even before therapy could be optimized.

Lung cancer rates are increasing in young women with adenocarcinoma being the most common subtype [9]. Tobacco smoking is the most common etiological factor for all histological forms of lung cancer [4]. Induction of mutations in tumor suppressor p53 gene is known to be the most frequent pathway for tumorigenesis in NSCLC [10]. Adenocarcinomas, owing to their peripheral location are frequently known to metastasize to the pleura and cause malignant pleural effusion. It is evident that EML4-ALK1 rearrangement plays a role

in pleural metastasis of adenocarcinoma [11]. It is also proposed that 216G/T polymorphism of the EGF receptor reflects a higher propensity for malignant pleural effusion [12]. Malignant pleural or pericardial effusion are considered to be distant metastasis and confer a worse prognosis.

Despite advances in management, the 5 year survival of lung cancer is less than 10% [2]. Diagnosis at an early stage, female gender, no significant weight loss and good performance status are related to a better prognosis and favorable response to therapy. Poor prognostic factors include mutations in p53 tumor suppressor gene, activation of K-ras proto-oncogene and metastatic spread at the time of diagnosis [8,10,13]. Moreover, most of the lung cancers are diagnosed at an advanced stage, making the survival worse. Metastatic stage IV is considered unresectable and is treated with chemoradiation [14]. Recent advances in immunotherapies and gene targeted therapies have led to significant changes in the management of NSCLC. The pathological specimen or malignant effusion is tested for EGFR sensitizing mutations and ALK rearrangement. Those positive for EGFR may be treated with tyrosine kinase inhibitors, while those exhibiting the ALK mutation may be treated with ALK inhibitors as first-line chemotherapy. If the tumor is EGFR and ALK-negative, first-line chemotherapy is usually a platinum-based doublet, with bevacizumab as a possible third agent [14]. Treatment of intra-cardiac metastasis is variable. It may differ on individual patient basis and varies from resection, chemotherapy or even radiotherapy. Newer biologic agents such as the PD-1 inhibiting antibody nivolumab may also be considered.

Conclusion

Cardiac spread of lung cancer as a mass within the left ventricle cavity is one of the rarest presentations. Early diagnosis is the most crucial for adequate treatment of lung cancer. This requires screening of the population at risk. Metastatic disease at presentation carries a poor prognosis despite all available therapies. Management of left ventricular cavity spread remains a matter of further research.

Patient consent

The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient's family as the patient is no longer alive.

Since the patient was not alive at the time of writing the case report, consent was obtained from the son of the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-chief of this journal on request.

Author contributions

PS prepared the manuscript. BU, VJ collected the images. YK supervised in final drafting.

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