

Multimodality Imaging of a Rare Case of Bronchogenic Cyst Presenting as New-Onset Atrial Fibrillation in a Young Woman



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INTRODUCTION

Bronchogenic cysts are rare congenital lesions arising from abnormal budding of the bronchial tree during embryogenesis. They most commonly occur in the mediastinum and account for approximately 5%–10% of mediastinal masses.¹ In a minority of individuals, these cysts are asymptomatic and incidentally diagnosed on cross-sectional imaging. The majority become symptomatic and present with symptoms related to compression of surrounding structures, such as dyspnea or superior vena cava syndrome. We present a rare case of a young woman with new-onset atrial fibrillation who was found to have a large bronchogenic cyst, initially on precardioversion transesophageal echocardiography (TEE) and subsequently on computed tomography (CT) and magnetic resonance imaging (MRI). The diagnosis was confirmed by histopathology after surgical resection.

CASE PRESENTATION

A 29-year-old woman with a history of hypothyroidism due to Hashimoto's thyroiditis was referred to a cardiologist for a new diagnosis of atrial fibrillation in the absence of traditional risk factors. Three weeks before presentation, she noticed intermittent episodes of palpitations lasting only a few minutes, which soon became constant and were accompanied by dyspnea on exertion while climbing stairs. Because this was her first documented episode of atrial fibrillation, she was referred for TEE and electrical cardioversion as part of an upfront rhythm control strategy.

TEE demonstrated a large, homogeneous, mildly echogenic mass in the near field on midesophageal views (Figure 1). This structure was well circumscribed and abutted the left and right atria, causing extrinsic compression of the left atrium and superior vena cava (Figure 2, Video 1). No color flow was seen within the mass. Because of this abnormal finding, cardioversion was canceled, and the patient was referred for further imaging. Concomitant transthoracic echocardiography confirmed a large echolucent structure poste-

rior to the left atrium with associated mass effect (Figure 3, Video 2). On further examination, the patient denied any dysphagia, and no signs of superior vena cava syndrome were seen.

Subsequently, contrast-enhanced chest CT demonstrated a homogeneous, hypodense central mediastinal mass measuring 7.4 × 6.6 × 6.4 cm with a radiodensity of 35 to 40 Hounsfield units. The structure caused compression of the superior wall of the left atrium, right inferior pulmonary vein, superior vena cava, and right main pulmonary artery (Figure 4). On MRI, the mass appeared well circumscribed with T2 hyperintensity but no internal enhancement (Figure 5). On the basis of multimodality imaging, the mass was most consistent with a bronchogenic cyst.

Given her symptoms of dyspnea and new-onset atrial fibrillation, the patient elected to undergo resection of the mass. Robotic surgery was performed through a right thoracoscopic approach. The mass was opened, and white chylous drainage was noted. The walls of the cyst were then resected from adjacent structures. Pathology confirmed the diagnosis of an inflamed bronchogenic cyst, and fluid cytology showed macrophages and inflammatory cells with no evidence of malignancy. She had an uneventful postoperative course and has remained well without recurrence of atrial fibrillation.

DISCUSSION

Bronchogenic cysts are rare congenital malformations arising from abnormal budding of the ventral foregut. Although they can be asymptomatic, many present with symptoms such as dyspnea, chest pain, or palpitations.^{2,3} They most commonly occur in the mediastinum and cause symptoms by direct compression of adjacent structures, as evidenced by previously reported cases of superior vena cava syndrome and postobstructive pneumonia.^{4,5} Rhythm disturbances such as heart block^{6,7} and even ventricular fibrillation⁸ have also been described, but predominantly with intracardiac bronchogenic cysts. Atrial fibrillation has been reported as the initial presentation of bronchogenic cysts located primarily within the posterior mediastinum,^{9,10} with the putative mechanism being direct compression and irritation of the left atrium and pulmonary veins.

Our patient highlights a novel case of a bronchogenic cyst presenting as new-onset atrial fibrillation that was first discovered on TEE and later verified on multimodality imaging. From an imaging standpoint, the mass posed several unique technical and diagnostic challenges on TEE. Given the location of the mass in the superior posterior mediastinum, the esophagus was displaced posteriorly and laterally, while the heart was displaced inferiorly. Initial transesophageal views at the location of a typical midesophageal four-chamber view showed the cyst in the near field, immediately adjacent to the probe. Because of the size of the mass and the limitations of the polar projection, it was difficult to fully visualize the mass and ascertain its exact relationship to surrounding structures. In terms of differential diagnosis, the mass was

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Conflicts of interests: Dr. Saric is a member of the Speakers' Bureau for Philips and Medtronic, and is on the Advisory Board for Siemens. The other authors reported no actual or potential conflicts of interest.

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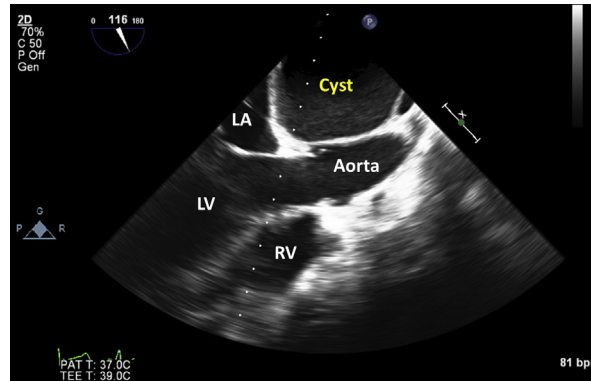


Figure 1 Midesophageal long-axis view on TEE shows the cyst directly adjacent to the probe and abutting the left atrium (LA) and ascending aorta. LV, Left ventricle; RV, right ventricle.

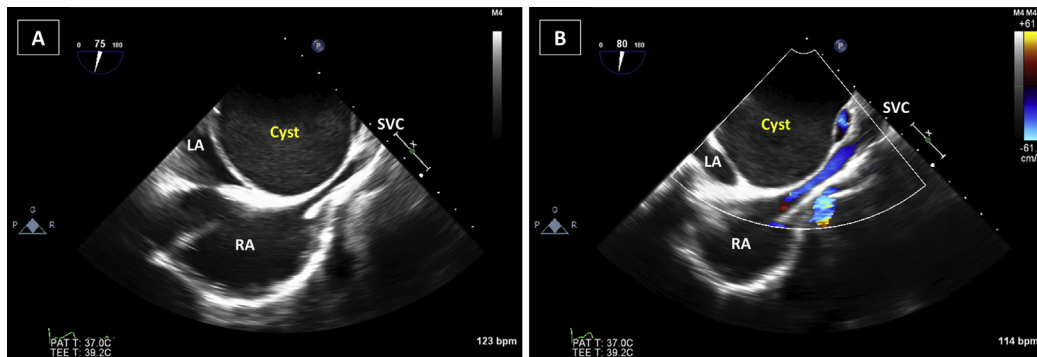


Figure 2 (A) Bicaval view on TEE shows the cyst compressing the superior vena cava (SVC). The left atrium (LA) is also displaced inferiorly. (B) Addition of color flow Doppler in the bicaval view on TEE shows significant compression of the SVC. RA, Right atrium.

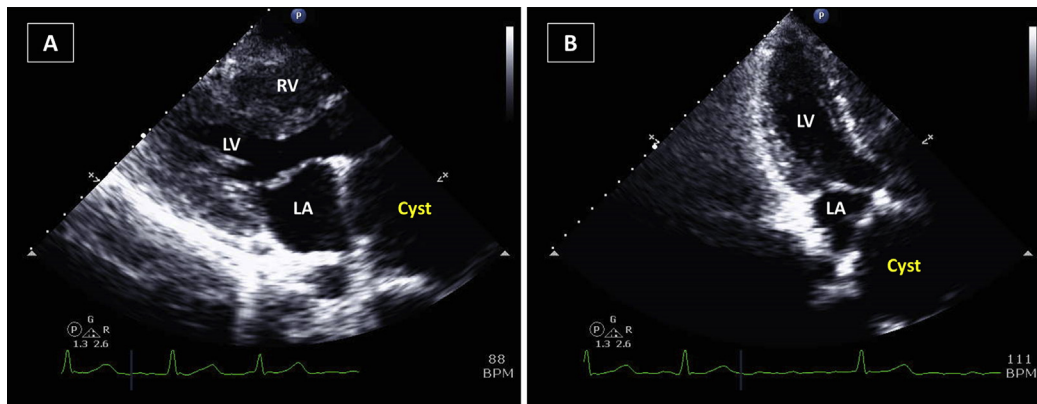


Figure 3 (A) Parasternal long-axis view on transthoracic echocardiography (TTE) shows the cyst superior to and compressing the left atrium (LA). (B) Apical three-chamber view on TTE shows the cyst compressing the left atrium (LA). RA, Right atrium; RV, right ventricle.

well circumscribed and partially echodense, making a benign cyst most likely, although a malignant lesion could not be ruled out solely on the basis of this appearance. No color flow was visualized within the structure, and there was no apparent communication with surrounding structures, making an esophageal or aortic outpouching less likely. Although transesophageal echocardiography provided valuable information, it was important to recognize the limitations of echocardiography in this case and to obtain additional multimodality imaging.

Further imaging with both CT and MRI provided critical information regarding the size, location, and characteristics of the mass. With improved spatial resolution of CT and MRI, the mass was clearly seen, causing compression of the left atrium, superior vena cava, right upper pulmonary vein, and right pulmonary artery. The appearance of the mass also significantly narrowed the differential diagnosis. On CT, bronchogenic cysts are typically sharply demarcated with smooth margins.¹¹ The attenuation of the mass can be variable, ranging from water attenuation to soft tissue attenuation. This variation is

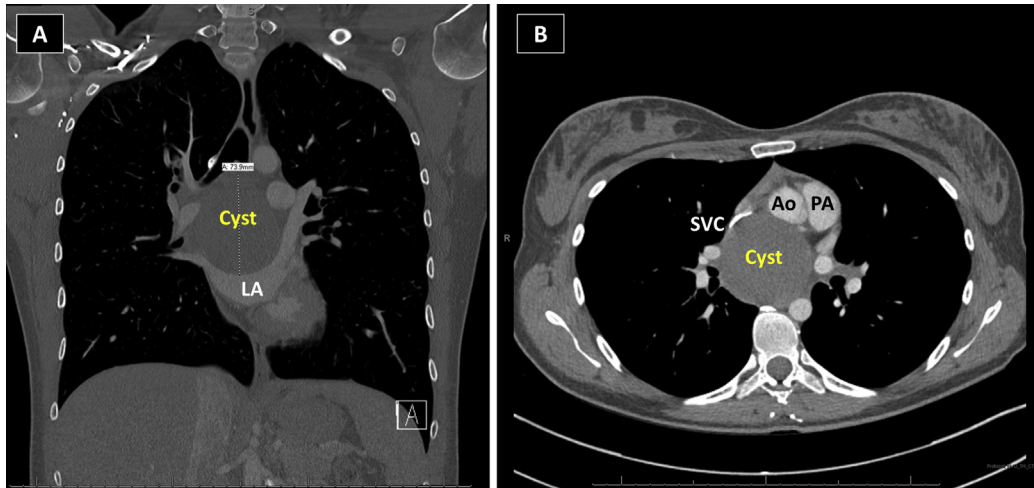


Figure 4 (A) Coronal view on contrast CT of the chest shows the location of the cyst in the posterior mediastinum. The cyst compresses the left atrium (LA) downward and causes mass effect on the pulmonary veins. (B) Axial view on contrast CT of the chest shows significant compression of the superior vena cava (SVC), leading to a slit-like appearance as it enters the right atrium. Ao, Aorta; PA, pulmonary artery.

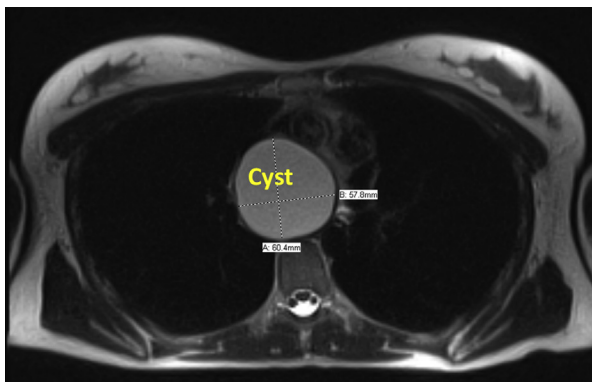


Figure 5 T2-weighted magnetic resonance image shows a well-circumscribed homogeneous T2 hyperintense mass with mild peripheral rim enhancement consistent with a bronchogenic cyst.

thought to be due to differences in fluid composition within the cyst. Inflammatory cysts contain turbid, mucoid fluid, and these have higher attenuation than simple serous cysts.¹² This patient was noted to have higher attenuation, which correlated with the complex chylous fluid drained during excision. On MRI, bronchogenic cysts are sharply margined and show T2 hyperintensity with no evidence of late gadolinium enhancement. The features of the mass on multimodality imaging were very characteristic of bronchogenic cyst, which helped make a preliminary diagnosis before final confirmation on histopathology.

CONCLUSION

We present a rare case of new-onset atrial fibrillation due to a large mediastinal bronchogenic cyst that was initially discovered on precardioversion TEE and subsequently confirmed on CT and MRI. We review imaging findings and highlight the characteristic features of bronchogenic cyst on each imaging modality. This case also empha-

sizes the importance of recognizing unexpected findings on otherwise routine imaging, understanding the strengths and limitations of each imaging modality, and using appropriate multimodality imaging to aid in diagnosis.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.case.2018.06.002>.

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