Use of Endobronchial Ultrasonography in the Diagnosis of a Pulmonary Artery Aneurysm
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We present the case of an 84-year-old man with nonmassive hemoptysis and an obstructing endobronchial mass who was referred for rigid bronchoscopy and biopsy of the lesion. We illustrate how the pulsatile movement of his endobronchial lesion could be differentiated by convex probe endobronchial ultrasound bronchoscopy to be a vascular lesion rather than an endobronchial mass or tumor. Although convex probe endobronchial ultrasonography has many mediastinal applications, it has yet to be used to characterize endobronchial masses. We describe the first case of using convex probe endobronchial ultrasonography in the diagnosis of a left upper lobe pulmonary artery aneurysm presenting as an endobronchial mass.


Pulmonary artery (PA) aneurysms should be considered as a possible cause of pulmonary lesions found on chest imaging. Often, these aneurysms can compress the surrounding parenchyma leading to difficulty in distinguishing them from solid masses on computed tomography imaging alone. Convex probe endobronchial ultrasound (CP-EBUS) bronchoscopy can be a useful tool in helping to differentiate vascular from solid endobronchial masses, and therefore may help avoid potentially disastrous interventions.

This is a case of an 84-year-old man with history of mild dementia and congestive heart failure presenting to an outside hospital with nonmassive hemoptysis and acute decline in mental status. The patient denied any recent fevers, chills, shortness of breath, or wheezing. He was a nonsmoker, did not use drugs, and had worked in a mine with exposures to gold dust. He denied a history of lung infections, tuberculosis, or trauma. After presentation, the patient had respiratory distress requiring mechanical ventilation. A computed tomography (CT) scan of the head revealed evidence of a new embolic cerebral vascular accident. A noncontrast CT scan of the chest revealed a left upper lobe endobronchial mass partially obstructing the lingula. The endobronchial lesion arose from the lateral wall of the left upper lobe bronchus. Several bilateral pulmonary nodules and left-sided pleural-based calcifications were also noted.

The patient was referred to our hospital because of concern for malignancy, endobronchial obstruction, and the need for rigid bronchoscopy, biopsy, and laser debulking.

Rigid bronchoscopy was performed under general anesthesia. There were several areas of abnormal-appearing mucosa in the right and left lower lobe bronchi. Several endobronchial biopsies were taken. With a flexible fiberoptic bronchoscope, we observed the endobronchial mass arising from the lateral aspect of the left upper lobe bronchus. The lesion appeared flesh colored and hypervascular (Fig 1). There was near-complete obstruction of the left upper lobe bronchus. We were able to traverse the mass with the bronchoscope, observing normal-appearing and patent bronchial segments in the left upper lobe and lingula. Given the tumorlike appearance of the mass, endobronchial biopsy was considered. However, upon continued examination through several circulatory cycles, the lesion was observed to be pulsatile, with its size changing in synchrony with the patient’s intermittent premature ventricular contractions. A convex probe endobronchial ultrasound (CP-EBUS) bronchoscope was used to interrogate the mass and revealed a hypoechoic vascular region with color Doppler flow signal (Fig 2), suggesting the finding of a PA aneurysm. Given the pulsatile nature of the mass, endobronchial biopsy was deferred. Magnetic resonance imaging and magnetic resonance angiography of the chest were performed, but were nondiagnostic owing to patient motion artifact. The CT angiography of the chest revealed a 1-cm left upper lobe PA aneurysm (Fig 3).

Fig 1. Endobronchial lesion visualized under conventional bronchoscopy.
The patient underwent percutaneous tracheostomy because of prolonged mechanical ventilation and was transferred to a long-term acute care center. After 8 weeks with inability to be liberated from mechanical ventilation, the patient was compassionately extubated and died.

Comment

Pulmonary artery aneurysms are rare and unlikely causes of pulmonary lesions identified on CT imaging [1–3]. Most cases arise from proximal pulmonary arteries and can compress the surrounding parenchyma, leading to difficulty in distinguishing them from solid masses on imaging alone [1, 2]. Pulmonary artery aneurysms may be congenital or acquired, and risk factors for their development include pulmonary hypertension, congenital heart disease, bacterial and fungal infections, collagen vascular disease, and degenerative changes in the elastic media [1, 2]. Syphilis and tuberculosis were once major causes in the era before antibiotics [2]. The prognosis for PA aneurysms is not clear. One report describes aneurysms that have been followed asymptptomatically for many years [4]. In a large autopsy series, PA aneurysms were identified in approximately 1 in 13,700 cases [5]. However, as the age of most aneurysms is unknown at the time of rupture, the overall rate of rupture is difficult to determine [2]. Given Laplace’s law, where the wall tension of a vessel is proportional to its radius, larger PA aneurysms are presumed to incur a higher risk of rupture.

Patients with PA aneurysms are usually asymptomatic, although symptoms of shortness of breath, cough, and chest pain have been reported [1, 2]. Evidence of right-side heart failure may be present secondary to pulmonic valve insufficiency, especially if the aneurysm has dilated the pulmonic valvular annulus [6]. Hemothysis suggests an unstable aneurysm that may be eroding through the airway mucosa [7].

Most PA aneurysms are diagnosed radiographically or at autopsy [1]. A chest roentgenogram can show small or large lesions resembling inflammation or a neoplasm [2]. Computed tomography imaging is more specific, and its utility is improved with the correct timing of injection of intravenous contrast material. Findings on chest roentgenogram and CT scan may be confused with solid masses [2]. Fluoroscopy may show a pulsation within the lesion, known as Pezzi’s sign or the “hilar dance” [5]. Computed tomography angiography or magnetic resonance angiography remain the diagnostic gold standard [2], but are more invasive and not readily available.

The natural history and optimal clinical management of PA aneurysms have not been well defined. Depending on the size, location, and associated symptoms of the PA aneurysm, along with patient comorbidities, treatment options include a conservative approach with serial imaging, nonsurgical embolotherapy, or definitive surgical repair [2, 7]. The optimal timing of surgical correction in appropriate candidates is not known, although most experts would agree that symptomatic patients as well as aneurysms of larger size should be treated with surgery [8]. There are various surgical approaches to PA aneurysms. Aneurysmorraphy, aneurysmectomy, pulmonic valve dilation, pulmonic valvulotomy, and grafting procedures have all been described in the surgical literature [8]. The optimal approach is tailored to the unique case, with patient anatomy, hemodynamics, and comorbidities as well as surgeon expertise all playing a role. In addition, PA aneurysm repair may be considered at time of concomitant coronary artery bypass grafting or valvular replacement [8].

There have been several case reports describing PA aneurysms presenting as endobronchial masses [1–3]. Interestingly, the aneurysms in each of these cases were initially misdiagnosed as solid lung masses on conventional imaging, even with intravenous contrast use. Additionally, given that normal pulmonary vessels do not typically protrude into the airway lumen [1], none of these aneurysms was correctly diagnosed by conventional bronchoscopic visualization. In 1 case, the
PA aneurysm was described as a smooth, orange-red endobronchial mass protruding into the airway lumen with a plexiform red pattern suggestive of a vascular region [1]. Biopsy or fine-needle aspiration of a PA aneurysm can have devastating consequences, and in some cases, can lead to massive intrapulmonary hemorrhage and death [1, 3].

Although PA aneurysms are rare causes of endobronchial lesions, it is important to be aware of them in the differential diagnosis. We describe a case of a PA aneurysm first suspected after visualizing pulsatile movement of an endobronchial mass under conventional fiberoptic bronchoscopy. The diagnosis was supported by CP-EBUS bronchoscopy and confirmed by CT angiography. Thus, CP-EBUS can be a useful tool in confirming the diagnosis of PA aneurysms and may help avoid potentially harmful biopsies or invasive interventions.

References