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Case report

Accessory cardiac bronchus with associated lung parenchyma: rare congenital tracheobronchial anomaly

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Abstract. Accessory cardiac bronchus (ACB) has been described mainly as case reports finding (frequency 0.08%-0.39%). Even though 50% of all ACBs have a blind extremity, imaging studies have demonstrated that some develop into a series of bronchioles with cystic degeneration or a ventilated lobule demarcated by an anomalous fissure and extremely rare with an abnormal pulmonary artery. In this case, ACB was demonstrated on several imaging methods arising from the intermediate bronchus's medial wall with correspondent blood vessels and fissure. Although an ACB is not a pathological entity and most patients with ACB are asymptomatic, it can become symptomatic due to recurrent infection, empyema, hemoptysis, and malignant transformation. In conclusion, both pulmonologists and radiologists should recognize normal bronchial anatomy and developmental bronchial anomalies, as these may be important to establish a correct diagnosis.

Key words: Accessory cardiac bronchus, anomaly of tracheobronchial tree, anatomic variation, lung parenchyma, recurrent respiratory infection

Introduction

Brock defined an accessory cardiac bronchus (ACB) in 1946 as a "supernumerary bronchus arising from the inner wall of the right main bronchus or intermediate bronchus opposite to the origin of the right upper lobe bronchus" (1).

The ACB progresses in a caudal direction toward the pericardium, paralleling the intermediate bronchus. It is lined by normal bronchial mucosa and contains cartilage within the wall, a distinguishing feature of the bronchial diverticulum or acquired fistula.

Mainly, ACB has been described as a case report finding with a frequency of 0.08%-0.39%. The mean largest diameter of ACB was 8.7 mm (range 4.0-13.8 mm), and the mean length was 11.9 mm (range 4.2-23.4 mm) (2,3).

Even though 50% of all reported ACBs have a blind extremity, considered Type 1 ABC - stump type, imaging studies have demonstrated that some develop into a series of bronchioles with cystic degeneration (Type 2: cystic, 25%) or a ventilated lobule demarcated by an anomalous fissure (Type 3: ventilated type, 25%) and extremely rare with an abnormal pulmonary artery (2, 4-6).

Case report

A 78-year-old male patient with a past medical history significant for recurrent exacerbations of chronic obstructive pulmonary disease (COPD) with emphysematous phenotype and extensive smoking history (75 pack/year) presented to our institution

with intensive productive cough and increased shortness of breath.

Physical examination revealed crackles in the right lung.

Blood tests were within normal limits. An obstructive pattern at the level of small airways was observed on spirometry.

Chest X-ray revealed hyperinflation and signs of chronic bilateral bronchial changes (Figure 1).

Severe centrilobular emphysema was demonstrated on contrast-enhanced chest computerized tomography (CT) with an appearing cystic area in the right retrocardiac region of the mediastinum, which was in communication with the intermediate bronchus. In addition, an accessory cardiac bronchus was demonstrated on coronal reformat images, arising from the medial wall of the intermediate bronchus with correspondent blood vessels and fissures (Figure 2a-2f).

Ventilation single-photon emission computerized tomography (SPECT) performed with Tc99m-Technegas confirmed the presence of the ACB arising from the intermediate bronchus with belonging ventilated parenchyma. Furthermore, the ACB arising from the intermediate bronchus was also shown on bronchoscopy (Figure 3a-3b).

Bronchoalveolar lavage, bronchial brushing, and catheter aspiration of the ACB were done with mucus and cell sampling. The cytology analysis revealed bronchial epithelium, mucus, neutrophilic leukocytes, and detritus, which supported a normal airway with infection.

Bronchoalveolar lavage cultures were negative for Mycobacterium spp., but positive of Aspergillus niger and Staphylococcus aureus.

After completing antibiogram-based antibiotic treatment, the patient's symptoms diminished with overall clinical improvement.

Discussion

Most patients with ACB are asymptomatic, and the anomaly is discovered incidentally during bronchoscopy or imaging studies conducted for unrelated reasons (6,7). However, an ACB can become symptomatic due to recurrent infection, empyema, hemoptysis, and malignant transformation (6-9). These symptoms are caused by the accumulation of mucus in the ACB, leading to inflammation with extensive microvascularization, especially when the ACB is

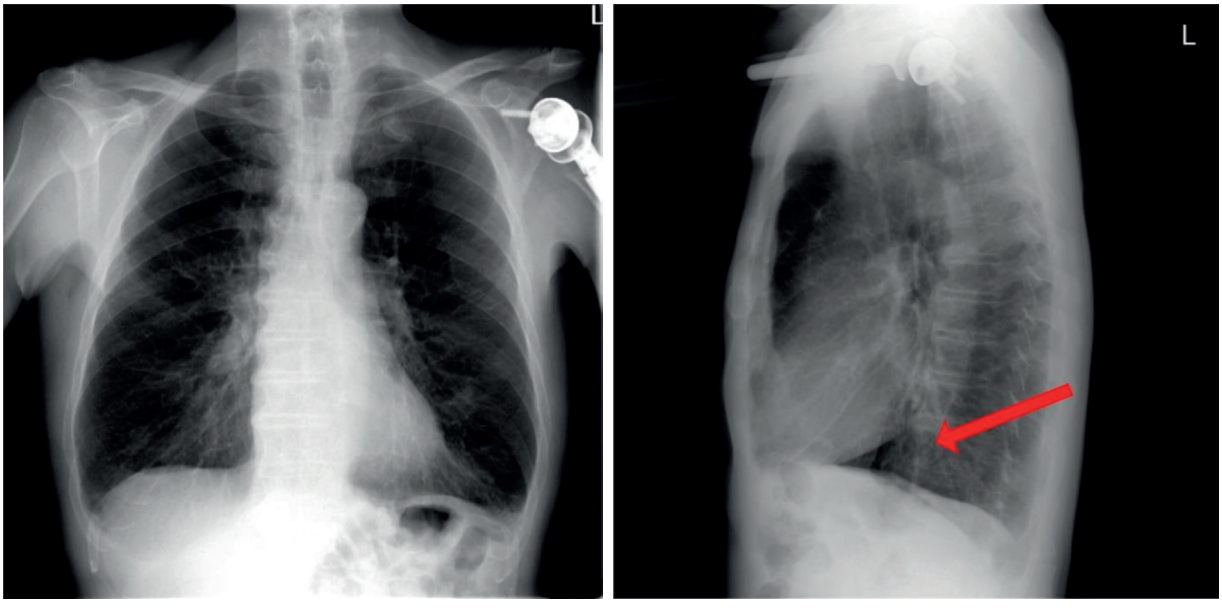

Figure 1. Standard chest X-ray images show hyperinflation and signs of bilateral chronic bronchial changes. Notice that hyperinflation is extensive in the retrocardiac region in the left lateral view (red arrow).

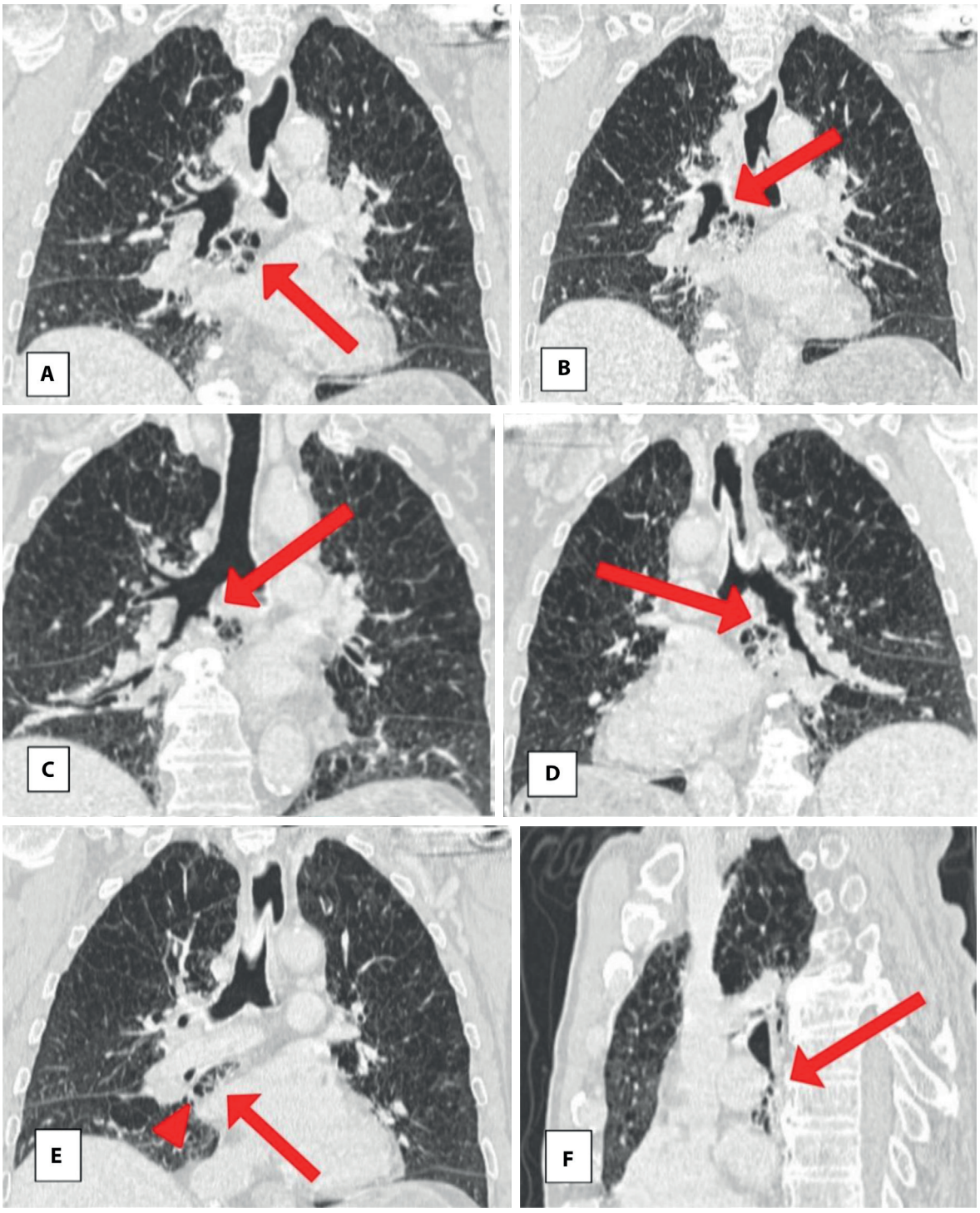

Figure 2a-2f. The reformatted chest CT scans. In the image a, a reformatted coronal chest CT scan shows an appearing cystic area in the right retrocardiac region (red arrow). Images b, c, and d show reformatted coronal chest CT scans with marked accessory cardiac bronchus (red arrow) arising from the medial wall of the intermediate bronchus with a correspondent lobule. In image e, the reformatted coronal chest CT scan shows an accessory cardiac lobe (red arrow) parallel with the intermediate bronchus and fissure of the lobule (red arrowhead). In image f, the sagittal reformatted chest CT scan demonstrates an accessory bronchus with corresponding pulmonary parenchyma in the retrocardiac region (red arrow).

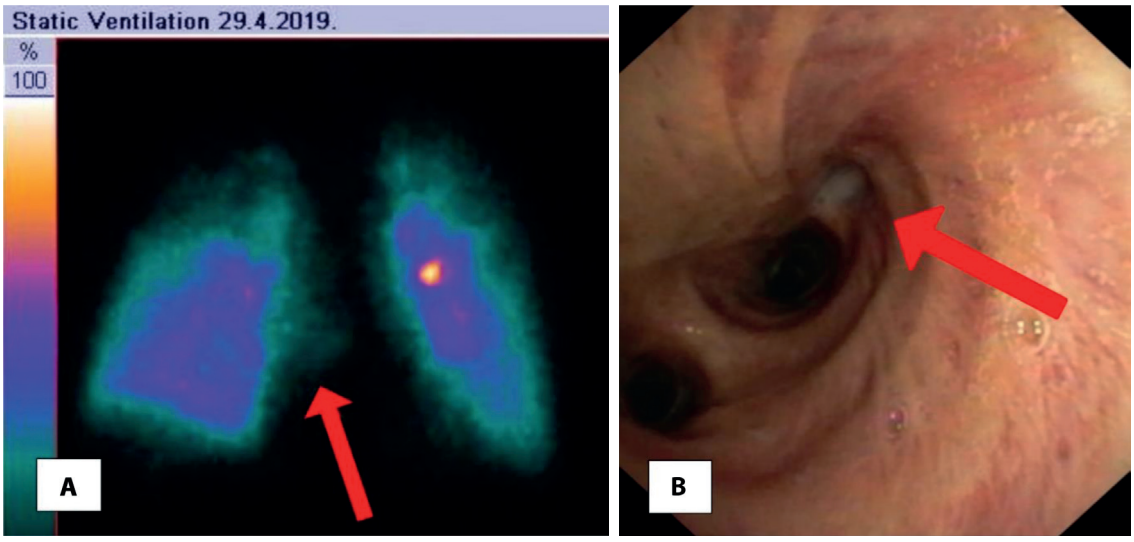

Figure 3a-3b. Ventilation scintigraphy (image a) shows an increased accumulation of inhaled radioactive aerosol in the right retrocardiac region, suggesting a ventilated part of the pulmonary parenchyma of an accessory cardiac bronchus (red arrow). Bronchoscopy (image b) shows the origin of the ACB filled with a large amount of mucus (red arrow).

long or has an accessory lobe (3,10). Thus, the short type of ACB tends to be asymptomatic, whereas the accessory-lobed and long diverticular types are more susceptible to complications (8).

Usually, the ACB is not visible on chest X-ray, but it can be well visualized using other imaging modalities. In particular, bronchial anatomy can be easily demonstrated on non-enhanced chest CT scans as a cross-sectional imaging modality with possible three-dimensional reconstruction.

As a therapy option, surgical resection for a long ACB or one with an accessory lobe is sometimes needed (7,8,10).

Both pulmonologists and radiologists should be able to recognize normal bronchial anatomy as well as developmental bronchial anomalies, as these may be important to establish a correct diagnosis. In addition, although an ACB is not a pathological entity, it can occasionally be associated with clinical symptoms and complications, such as airway damage during endotracheal intubation.

Ethics Committee: All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This is an observational study. Formal consent is not required for this type of study because no personal data was contained, and there is no concern about identifying information.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangement, etc.) that might pose a conflict of interest in connection with the submitted article.

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