The Accessory Cardiac Bronchus
Bronchologic Aspect and Review of the Literature

Victor G. Mangiulea, M.D.,* and Răzvan V. Stinghe, M.D.**

Bronchial anomalies, although rare, represent an important chapter of respiratory diseases, both because of their theoretical interest and practical significance in surgical practice. In this study we presented nine patients having accessory cardiac bronchi which were discovered during systematic bronchoscopies performed for other diseases. Only in one case was this anomaly manifested by repeated cough and hemoptysis, without any other detectable cause. In all cases, the bronchus arose from the medial wall of the intermediate bronchus. In two cases, there were noted peculiar aspects of this anomalous bronchus: one of them was associated with a right tracheal bronchus and the other consisted of two accessory cardiac bronchi. The literature data show that this anomaly is congenital, being produced by a disorder occurring in the fifth week of embryonic life.

This interesting anomaly, originally noted by Broekl and so named by Huzly and Boehm,2 is now a well-recognized anomaly, recorded by many authors.2-11 In the Bronchological Department of the Bucharest Chest Clinic, we have observed nine cases, and among these, two had peculiarities of great rarity.

CASE REPORTS

Eight patients were adults, and the ninth, a child; eight were males and one a female. The incidence of this abnormal bronchus was 0.09 percent of all patients submitted to bronchoscopy in our department, since 1962. In eight cases, the discovery of this anomaly occurred during bronchoscopy performed for other clearly defined diseases (pulmonary tuberculosis, bronchogenic carcinoma, chronic bronchitis). In one case, bronchoscopy was performed in order to discover the cause of cough and hemoptysis. In each of these patients, the existence of this anomaly was unsuspected.

Bronchoscopic Aspect

In all cases, this supernumerary bronchus was found only in the right bronchial tree, namely on the medial wall of the intermediate bronchus, either in its superior half (seven cases), or in its distal half (two cases). From this point of origin, the bronchus was directed caudally, towards the mediastinum. In all cases, both the bronchus and its orifice had normal walls, with visible cartilaginous rings and normal mucosa. The breadth of the orifice was similar to that of a segmental bronchus. The length was variable: in six cases it was short, the bronchus being rather a diverticulum with blind extremity located near its emergence. In the three other cases, it was much longer, the distal extremity not being visible, either by direct view, or by lateral telescopic view. In these cases, the visible part of the bronchus had no collaterals. In one patient, we noted an abnormal movement of a diverticulum, which contracted during coughing. In another, associated with bronchiectasis, we observed purulent material in the diverticulum. In two cases, the right bronchial tree had an additional anomalous bronchus: in the first of these, the second anomaly was a right tracheal bronchus; in the second case, there were two accessory cardiac bronchi, one of them diverticular, and the other longer than usual. This double accessory cardiac bronchus is unique in the literature. In all cases, the normal lobar and segmental bronchial orifices were present.

Bronchographic Aspect

The bronchographic aspects confirmed endoscopic findings: the contrast medium outlined the abnormal bronchus, and exactly established its position, direction, length and breadth. We could differentiate by bronchographic findings, three types: (1) a short and diverticular type, with blind extremity (four cases, Fig 1); (2) a long type, with terminal sprigs, which ventilated a small undeveloped lobe (three cases, Fig 2). In these cases, we noted either a distal dilatation, or, contrary, a narrowed lumen of the bronchus; (3) An intermediate type, with long diverticulum, but no bronchial or alveolar arborization (two cases, Fig 3).

Clinical Manifestation

In one patient only, there was massive, repeated hemoptysis without x-ray changes. Bleeding was believed to originate from this abnormal and widened bronchus (Fig 2). No other possible cause of hemoptysis could be found. In all other cases, the whole clinical and roentgenologic picture could have been explained by the concomitant disease.
FIGURE 1. Accessory cardiac bronchus of diverticular type arising from the medial wall of the intermediate bronchus in its superior half. No clinical manifestation.

FIGURE 2. Double accessory cardiac bronchus: one superior, of diverticular type; the other, below the first, is of long type, with distal dilatation of its lumen and terminal sprigs. In the clinical picture, there was repeated cough and hemoptysis without any other detectable cause.

FIGURE 3. Accessory cardiac bronchus of intermediate type (long diverticulum without sprigs or terminal arborization). No clinical manifestation.

**DISCUSSION**

The accessory cardiac bronchus is a very rare bronchial anomaly (with incidence of 0.13–0.14 percent in other authors’ material). Strictly the medial wall of the intermediate bronchus is involved in this condition.

In normal subjects, the sole bronchus arising from the medial wall of the right stem bronchus is the segmental medial basal bronchus (the para-cardiac, or B7 of other anatomic nomenclatures). This segmental bronchus arises from the medial wall of the right lower lobe bronchus, below both the emergence of the middle and superior bronchus. The authors who studied the anatomic variations of this segmental bronchus, found that it is divided in two separate twigs in 12 percent of cases, but both of them arise from the lower lobe bronchus. Ferry and Boyden established that in 20 percent of subjects, the medial basal bronchus is absent as such, its anterior and medial rami arising separately as accessory branches of the anterior basal bronchus and of the posterior basal bronchus. In normal subjects, both American and French authors did not note a displaced branch of medial basal bronchus arising from the medial wall of the intermediate bronchus. Thus, the accessory cardiac bronchus has no relations to B7, which has its own anatomic variations and anomalies restricted to the lower lobe bronchus.
Its etiology is congenital. It is known that the tracheobronchial tree develops between the fourth and sixth week of intrauterine life, arising as a groove from the ventral wall of the primitive intestine in its cervical region; this groove deepens progressively and gives rise to trachea and paired lungs, which differentiate into main, lobar, segmental bronchi, until the sixth week of fetal life, when the primitive respiratory system is developed. Thus, presumably, an anomaly concerning the zone of the intermediate bronchus is produced by a variation (one or more buds developing upon it) during the fifth week of embryonic life. According to Bolla's opinion, there are two possibilities of genesis of this anomalous bronchus: on one hand, when the anomaly is solitary, the cause is a "phylogenetic return" to a normal aspect of the bronchial tree anatomy concerning inferior mammals (cattle, sheep). In these animals, the accessory cardiac bronchus is normal, ventilating the "azygos lobe," located between the cava vein (inferior in human anatomy) and the right face of the mediastinum. In our material, as mentioned, this anomalous outgrowth was divided into two branches in one case, which might indicate that the corresponding groove had been divided initially.

On the other hand, when the anomaly is an element of a complex malformation, its pathogenesis is either genotypical or phenotypical. In the first type, the anomaly is familial; in the second type various injuries (viral, toxic) occurring in the maternal organism in the fifth week of pregnancy, the disease is individual. We believe that two patients of our series had this cause: the patient with right tracheal bronchus, and a child with associated idiopathic bronchiectasis. It is of great nosological interest that the accessory cardiac bronchus is the single true supernumerary bronchus, because the tracheal bronchus or other abnormally divided bronchi are not usually supernumerary; they correspond to normal bronchi, which are only out of place.

Its origin is variable within the trajectory of the intermediate bronchus, but it never arises over or under its limits, and it has never been recorded in the left bronchial tree.

A peculiarity of this anomaly, of great interest is the ratio in our series of eight men to one woman, a similar situation reported by other authors. Subsequent genetic research will clear up this different behavior of two sexes.

The bronchoscopic and bronchographic aspects do not differ from those given by other authors. All have shown that this bronchus was casually discovered during bronchoscopies performed for other diseases.

This abnormal bronchus, either of short or of long type, may have associated pathology, such as inflammation, or lymph node tuberculous fistulae within its walls. Malignancy has not been reported in this bronchus. It is uncommon that hemoptysis is caused by this anomaly but some rare cases prove that it is possible. We presented such a case, without any other detectable cause. Bleeding is the manifestation of vascular abnormalities. Bolla and Zanotelli remarked that these patients also lack mechanisms of anti-infectious defense, so that chronic bronchitis occurs more frequently in them.

It is possible that other diseases may simulate the form of the accessory cardiac bronchus. Various fistulae within the intermediate bronchus (most frequently of tuberculous origin) with persistence of the fistular route, may have the same endoscopic picture. But in these cases, as Williot et al. have remarked, there are no cartilaginous rings in the wall of such a diverticulum, and anthropatic impregnation attests to the lymph node origin. Again, there is a little neck at the implantation site of the fistula of the bronchial tree, well-visible on the bronchogram. We have recorded a similar case with post-tuberculous esophageal-bronchial fistula on the intermediate bronchus, which presented a bronchoscopic aspect like that of the anomalous bronchus. Ignorance of the previous causal disease may confuse the issue.

The significance of the discovery of this anomaly is that it enables us to separate congenital variations from lesions of the intermediate bronchus. Rarely does it give rise to clinical manifestation in a patient. In cases with symptomatology with repeated occurrence, surgical removal is advisable, particulary in those cases with long diverticula (our type 2), which seems to ventilate a little pulmonary lobulus, so that the disease appears to involve an abnormal segmental tissue of the right lung.

References

1 Brock, R. C.: The anatomy of the bronchial tree, Oxford University Press, 1946.
5 Cremers, V., Couvreur, J., and Gerbeaux, J.: Anoma-


Reprint requests: Razvan Stinghe. Institutul Clinic de Fiziologie, Sos. Viilor 90, Bucuresti-28 Rumania