

Case Report

Tracheal bronchus associated with recurrent pneumonia

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ABSTRACT

Abnormalities of the major airways are uncommon congenital conditions which occur in approximately 2% of the adult population. Usually aberrant bronchi are asymptomatic and are only found by coincidence. We present the rare case of a 49-years-old woman with a tracheal bronchus associated with recurrent pneumonia of the right upper lobe.

INTRODUCTION

Congenital abnormalities are only infrequently encountered during bronchoscopy or bronchography¹. In adults these conditions are occasionally associated with pulmonary infections and recurrent pneumonia². In the daily clinical routine delayed diagnosis is quite frequent because anatomical variants of the airways are not routinely included in the differential diagnosis of persistent or recurrent pulmonary infections.

CASE HISTORY

A 49-year-old woman with a history of recurrent right upper lobe pneumonia was admitted to our department of thoracic surgery. For more than 10 years she has repeatedly sustained pulmonary infections and has been in hospital on several occasions. During the last episode of pneumonia bronchoscopy had been performed for the first time. An accessory bronchus originating from the proximal right main bronchus was found [Fig 2]. The regular right upper lobe bronchus was not displaced but consisted of only two segmental bronchi. Computed tomography of the chest confirmed the diagnosis of an aberrant apical segmental bronchus of the right upper lobe [Fig 1], a so called tracheal bronchus. Furthermore, the images showed acute as well as chronic inflammatory lesions and calcifications within the apical segment of the right upper lobe [Fig 1c]. The parenchymal changes were limited to this segment and formed tumorlike nodules. Preoperative FDG-PET-CT was not obtained.

She underwent segmentectomy of the apical upper lobe segment. Upon operation we encountered the tracheal bronchus which led into the apical segment. The anatomy of the pulmonary artery as well as the venous drainage was normal. There were dense inflammatory adhesions between the tip of the right lung and the parietal pleura as an expression of the recurrent infections. The apical segment showed numerous nodules and calcifications. Frozen section was obtained to rule out pulmonary carcinoma.

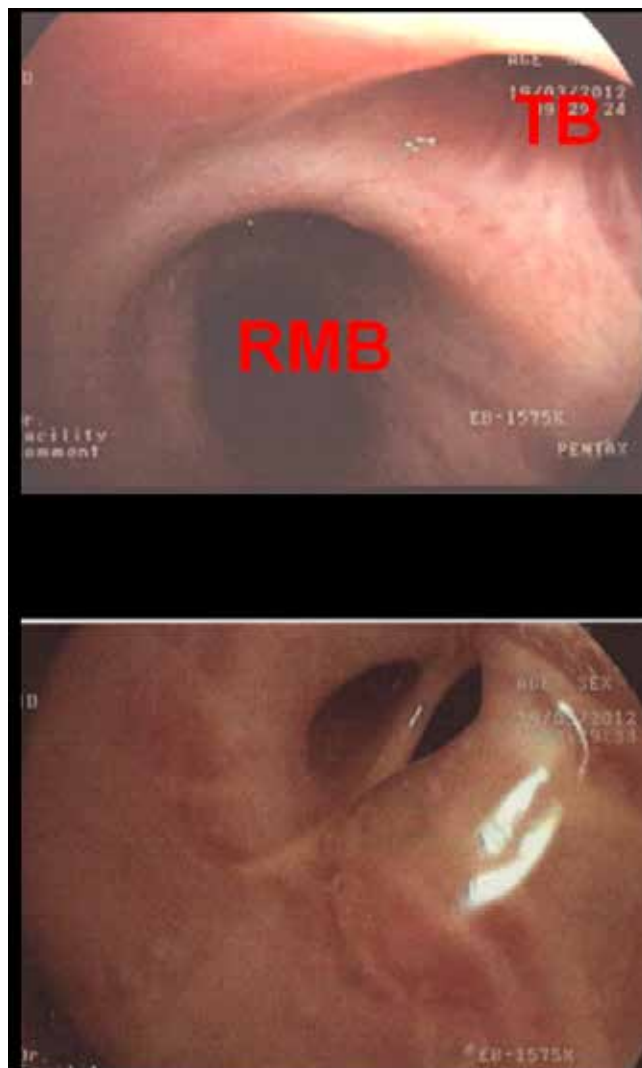


Figure 2. Bronchoscopy

The bronchoscopic image (Fig 2a) shows the origin of the tracheal bronchus (TB) nearly at the bifurcation. The proximal right main bronchus (RMB) is also visible. A view into the tracheal bronchus is provided by figure 2b. The orifice seems to be partially narrowed.

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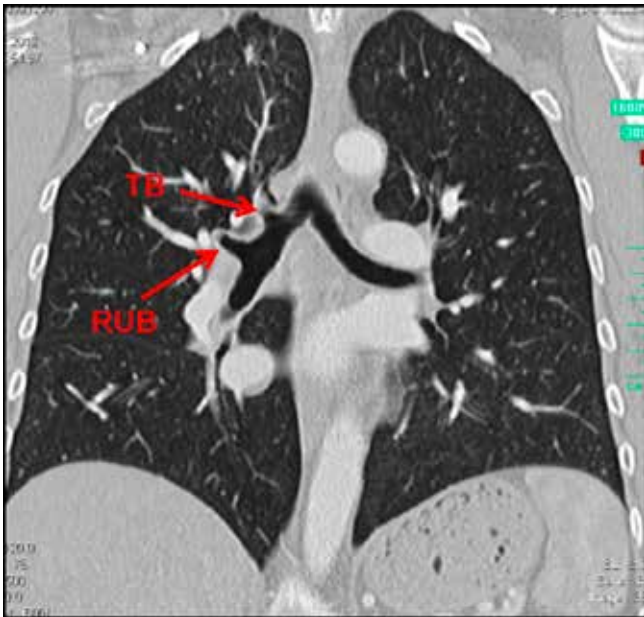


Figure 1a. Frontal CT image

The tracheal bifurcation is visible in this frontal view of the computed tomography of the chest. The origin of the tracheal bronchus is visible virtually at the carina (TB). The regular right upper lobe bronchus (RUB) itself is not displaced. There are no further recognizable abnormalities of the airways.

The pathological examination of the specimen confirmed the diagnosis of recurrent pneumonia with fresh and older inflammatory lesions without malignancy. The postoperative course was uneventful. The patient recovered fast and was discharged from hospital at the 7th postoperative day. Afterwards there were no clinical or radiographic signs of recurrent pulmonary infection during a follow up period of altogether nine months.

DISCUSSION

The first description of a tracheal bronchus derives from the

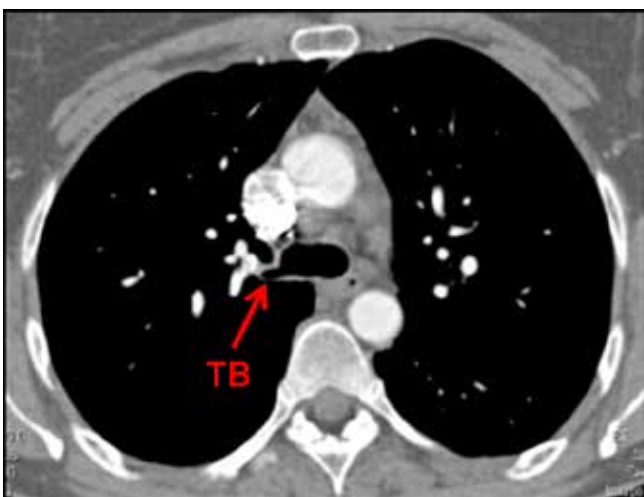


Figure 1b. Axial CT image

This axial view is situated at the level of the tracheal bifurcation. The division of the distal trachea into the two main bronchi is already identifiable. The origin of the tracheal bronchus (TB) is shown.

18th century anatomist Eduard Sandifort (1742-1814), who was chair of anatomy and surgery at the Dutch university of Leiden. Since then congenital abnormalities of the tracheobronchial tree have been studied by anatomist as well as by clinicians. Nowadays, the term tracheal bronchus encompasses several kinds of anomalous bronchi which originate from either the distal trachea or the right main bronchus and direct to the right upper lobe¹⁻³. In case of normal branching of the right upper bronchus in combination with an accessory airway, the anatomic variant is called a supernumerary bronchus. However, displaced tracheal bronchi are more frequent. In those cases the upper lobe bronchus is devoid of a recognizable apical segmental bronchus. Therefore, the aberrant bronchus is called a displaced bronchus.

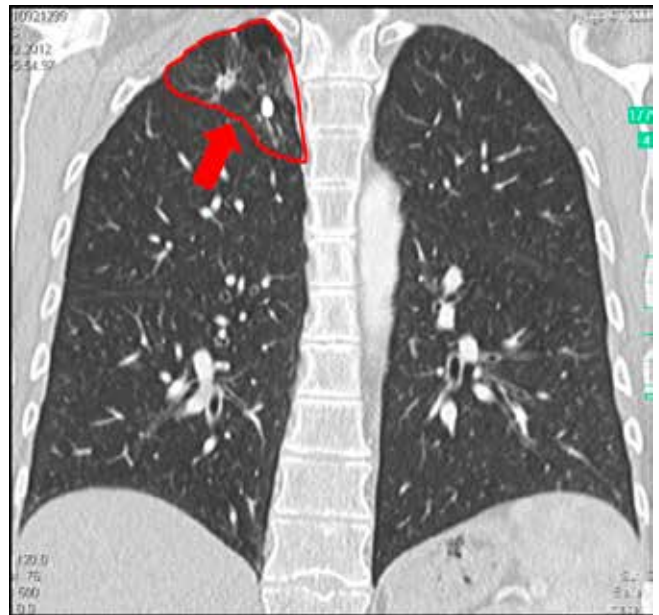


Figure 1c. Inflammatory lesions

The frontal CT image shows numerous inflammatory lesions and parenchymal changes within the right apical upper lobe segment, which is marked by a red contour (arrow). The morphological alterations comprise tumorlike lesions, calcifications and bullae. The other parts of the lung show no signs of pathological transformation.

Such congenital abnormalities are rarities. In the year 1962 Le Roux examined 1000 consecutive bronchograms, which had been obtained at the Regional Thoracic Unit in Edinburgh⁴. Altogether he encountered only 30 abnormalities of the right upper lobe bronchus. The most common disorder was an apical segmental bronchus originating from the trachea or the main bronchus. He found such a condition in 14 out of 1000 bronchograms⁴. Our patient had a displaced bronchus directing to the apical segment. The anatomy is clearly visible in the coronary CT images [Fig 1a+b].

Those congenital malformations are usually asymptomatic in adults whereas they are quite frequently associated with respiratory complications in paediatric patients. In a series comprising 18 infants with tracheal bronchus, resection of the right upper lobe due to recurrent pneumonia was eventually

mandatory in five cases⁵. Persistent or recurrent pneumonia as well as the occurrence of bronchiectasis caused by a tracheal bronchus have also been reported in adults. Furthermore, pulmonary actinomycosis and haemoptysis have reportedly been associated with a tracheal bronchus^{3,6}. Because of the rareness of the underlying condition the literature comprises mainly reports of single cases.

In our case, the tracheal bronchus was responsible for recurrent pneumonia with severe morphological changes of the lung parenchyma [Fig 1c]. The diagnosis was only established with considerable delay. Following segmentectomy the patient recuperated well. Henceforth she has been healthy and has shown no signs of pulmonary infections. This finding is in conformance with the results of the above mentioned paediatric series in which lobectomy led to resolution of the recurrent pneumonia, too. Similar outcome has been observed for surgical treatment of bronchiectasis in adults. Effective relief of symptoms is achievable by complete resection of all lung tissue with bronchiectatic destruction^{7,8}. Segmentectomy of the lung is a safe procedure without a noteworthy loss of lung capacity. Hence, resection of the affected segment in case of a bronchial abnormality associated with pulmonary infections is justified and provides definite cure.

Moreover, distinction between an inflammatory lesion, as in our case, and a pulmonary neoplasm can only be obtained by pathological examination of the specimen. Even ¹⁸F-FDG-PET which is generally a valuable tool for diagnosis of pulmonary malignancies is considered to be of limited use for proper differentiation of lung cancer from pulmonary inflammation. Neoplastic as well as inflammatory nodules show increased glucose metabolism resulting in enhancing lesions on PET images. Therefore these findings have to be carefully interpreted and the conclusions are often uncertain and indeterminate with a reported accuracy of only 70%⁹. As a consequence, surgery is also indicated to rule out lung cancer¹⁰.

In conclusion, congenital abnormalities of the bronchi are rarities among the adult population and are mostly asymptomatic. Nevertheless, a tracheal bronchus can be associated with recurrent pulmonary infections and tumorlike inflammatory lesions. Then operative management by means of segmentectomy provides cure and simultaneously rules out lung cancer.

The authors have no conflict of interest.

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