Aberrant origin of the right upper lobe bronchus

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Section: Chest Imaging
Imaging Technique: CT

Case Type: Clinical Cases
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Patient: 15 years, male

Clinical History:
Progressive lung infiltration on chest X-ray after renal transplantation.

Imaging Findings:
The patient presented with respiratory distress, hypoxia and malaise after renal transplantation. There was a history of recurrent respiratory tract infections, dialysis because of renal dysplasia, and cardiac failure.

Because of progressive lung infiltrations seen on chest X-ray, a spiral CT of the chest without contrast administration was performed, revealing the presence of ground-glass opacifications in the right upper lobe and an anatomic variant by which the right upper lobe bronchus originated from the trachea. Coronal, 3D reconstructions and virtual bronchoscopy were also performed.

Discussion:
A tracheal bronchus was first described by Sandifort in 1785 as a right upper lobe bronchus originating from the trachea. In the recent literature, however, the term tracheal bronchus encompasses a variety of bronchial anomalies originating from the trachea or main bronchus and directed to the upper lobe territory. Many congenital variations of the bronchial tree in number, length, diameter, and position of the bronchi have been described.

Classic descriptions of bronchial anatomy have been made from chest X-rays, conventional tomography, bronchography, CT and MR imaging. Recently, the capacity of spiral CT to explore a complete volume with no gap and excellent multiplanar reconstructions and 3D reformations has been emphasised. Therefore, spiral CT is the preferable technique for studying congenital abnormalities of the tracheobronchial tree. In most cases spiral CT permits a full and correct evaluation of the malformation and its associated anomalies.

Contrary to the numerous variations of lobar or segmental bronchial subdivisions, abnormal bronchi originating from the trachea or main bronchi are rare. A prevalence of 0.1%-2% for right tracheal bronchus and 0.3%-1% for left tracheal bronchus has been found in bronchographic and bronchoscopic studies. All bronchial anomalies affecting the upper lobe are seven times more frequent on the right side.

These bronchial anomalies can be classified by origin or by type (supernumerary vs displaced).
• The normal right upper lobe bronchus is described as eparterial because it arises above the right pulmonary artery. The normal left upper lobe bronchus is described as hyparterial because it arises below the left pulmonary artery.

• An anomalous bronchus arising proximal to the origin of the upper lobe bronchus is called pre-eparterial on the right side and eparterial or prehyparterial on the left side.

• An anomalous bronchus arising distal to the origin of the upper lobe bronchus is called posteparterial on the right side and posthyparterial on the left side.

These bronchi are described as supernumerary when they coexist with a normal type of branching of the upper lobe bronchus. They may ventilate normal lung, or end in a communicating or noncommunicating cyst. They are described as displaced when, in addition to the aberrant bronchus, one branch of the upper lobe bronchus is missing. This fact is well demonstrated with high-resolution spiral CT, which can demonstrate that the aberrant bronchus may correspond to a segmental, subsegmental, or subsubsegmental bronchus.

The displaced type is more frequent than the supernumerary type. A true (displaced) tracheal bronchus is any bronchus originating from the trachea, usually within 2cm of the carina and up to 6cm from the carina. When the entire right upper lobe bronchus is displaced on the trachea, it is also called a "pig bronchus" and has a reported frequency of 0.2%.

Although these aberrant bronchi are usually asymptomatic, respiratory distress may occur if drainage is impaired or in association with other abnormalities. In the literature, these aberrant bronchi have manifested as recurrent local infections, persistent cough, stridor, acute respiratory distress (especially in children) and haemoptysis. Bronchiectasis, atelectasis, focal emphysema (especially of the left upper lobe), and cystic lung malformations may coexist.

Knowledge and understanding of this congenital bronchial abnormality may have important implications for diagnosis, bronchoscopy, surgery, and intubation!

Differential Diagnosis List: Tracheal bronchus

Final Diagnosis: Tracheal bronchus

References:

Zylak CJ, Eyler WR, Spizarny DL, Stone CH.

Developmental Lung Anomalies in the Adult: Radiologic-Pathologic Correlation.


Ghaye B, Szapiro D, Fanchamps JM, Dondelinger RF.

Congenital Bronchial Abnormalities Revisited.


Middleton RM, Littleton JT, Brickey DA, Picone AL.

Obstructed tracheal bronchus as a cause of post-obstructive pneumonia.


Siegel MJ, Shackelford GD, Francis RS, McAlister WH.
Tracheal bronchus.

Radiology 1979 Feb;130(2):353-5. (PMID: 760149)
Beigelman C, Howarth NR, Chartrand-Lefebvre C, Grenier P.

Congenital anomalies of tracheobronchial branching patterns: spiral CT aspects in adults.

Description: Ground-glass opacity in the right upper lobe. The ground-glass opacities are due to pulmonary infection (pneumonia). Normal carina. Origin:
**Description:** The upper lobe bronchus is lying next to the trachea. **Origin:**
Figure 2

Description: The upper lobe bronchus originates from the distal trachea, proximal to the carina. Origin:
**Figure 3**

Description: The upper lobe bronchus originates from the distal trachea, proximal to the carina. Origin:
Figure 4

a

Description: Virtual bronchoscopy shows the aberrant right superior bronchus. Virtual bronchoscopy passes the distal trachea, showing a narrowed carina. **Origin:**

b

Description: Passing along the origin of the tracheal bronchus, virtual bronchoscopy shows the head carina which is narrowed antero-posteriorly. Virtual bronchoscopy allows passage into the right bronchus which is open and well permeable. **Origin:**