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CASE REPORT

Bronchiectasis arising from a tracheal bronchus: A case report

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Abstract

Tracheal bronchus, also known as «bronchus suis,» is a rare congenital airway anomaly, often discovered incidentally, with an incidence of less than 2%. We present the case of a 38-year-old male patient with dyspnea, bronchial syndrome, and recurrent respiratory infections. A noncontrast chest computed tomography scan revealed a tracheal bronchus originating from the right lateral tracheal wall, approximately 2 cm above the carina, complicated by infected cylindrical bronchiectasis in the right upper lobe. The patient was managed with antibiotics and pulmonary rehabilitation, showing significant improvement. This case highlights a rare condition and underscores the importance of early recognition and imaging for accurate diagnosis and optimal patient management.

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Introduction

Tracheal bronchus, also referred to as *bronchus suis*, is a rare congenital anomaly of the bronchial tree, originating directly from the trachea. It is most often an incidental finding on computed tomography (CT) or bronchoscopy, with a reported incidence of less than 2% [1,2]. Tracheal bronchus arises due to abnormal migration of bronchial mesenchyme into the tracheal epithelium during embryogenesis. While most patients remain asymptomatic, complications such as recurrent infections can lead to nonspecific respiratory symptoms, including dyspnea and productive cough. Diagnosis in symptomatic cases relies on advanced imaging, primarily CT. Management is typically conservative, but surgery may be required in selected cases.

Case Report

We report the case of a 38-year-old male, a chronic smoker with a 12-pack-year history, who presented with progressively worsening dyspnea, persistent morning bronchorrhea, and greenish sputum, along with a sensation of fever. Clinical examination revealed a febrile patient (38.5°C) with coarse breath sounds in the right upper lobe. A noncontrast chest CT scan revealed cylindrical and varicose bronchiectasis in the right upper lobe, associated with peribronchial thickening, indicative of superinfection (Fig. 1). Proximal airway analysis identified a tracheal bronchus originating directly from the right lateral border of the trachea, leading to the bronchiectasis (Fig. 2). Coronal minimum intensity projection (MinIP) reconstructions, which enable the detection of low-density structures in a given volume and thus enhance visualization of bronchi, highlight the aberrant tracheal bronchus, aiding in precise anatomical assessment and diagnostic accuracy (Fig. 3).

Bronchoscopy revealed a 10 mm-wide opening located approximately 2 cm above the carina on the right lateral wall of the trachea, consistent with a tracheal bronchus. These findings confirmed the diagnosis of a complicated tracheal bronchus with superinfected bronchiectasis. The patient showed clinical improvement following symptomatic management, including bronchodilators, antibiotic therapy, and respiratory physiotherapy.

Discussion

The tracheal bronchus, also referred to as *bronchus suis* or *«pig bronchus»* (a normal anatomical feature in pigs), is a rare congenital anomaly of the bronchial tree. It typically arises from the lateral wall of the trachea, approximately 1–2 cm above the

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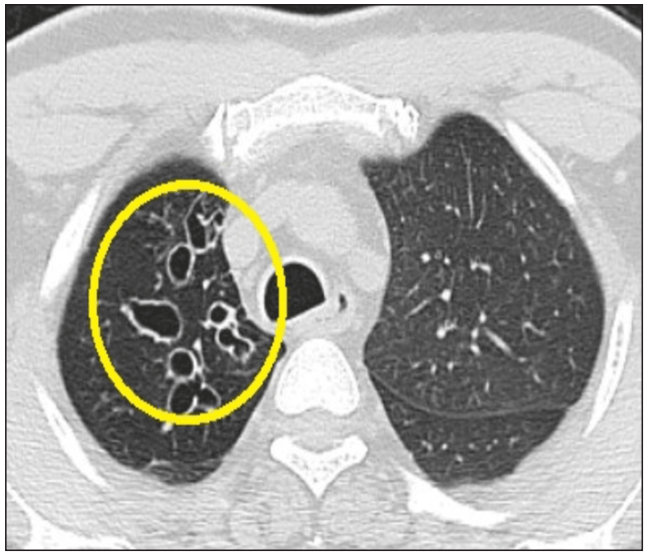


Figure 1. Presence of cylindrical and varicose bronchiectasis in the right upper lobe, accompanied by peribronchial thickening indicative of superinfection (yellow arrowhead).



Figure 2. Coronal reconstruction highlights a tracheal bronchus originating from the right lateral wall of the trachea, proximal to the tracheal bifurcation, and extending into the superinfected bronchiectasis.

carina, and supplies ventilation to part or all of the upper lobe. First documented by Sandifort in 1785, this anomaly is more prevalent in males and is predominantly found on the right side. Its reported incidence varies between 0.001% and 2.0%, based on findings from autopsies, bronchoscopies, and radiological studies [1,2].

The embryological basis for tracheal bronchus, as proposed by Alescio and Cassini, involves abnormal migration of bronchial mesenchyme into the



Figure 3. Coronal MinIP reconstructions highlight the aberrant tracheal bronchus, aiding in precise anatomical assessment and diagnostic accuracy.

tracheal epithelium during development. Tracheal bronchi are classified into two main types: supernumerary and displaced. A supernumerary tracheal bronchus, as observed in our patient, occurs alongside the normal trifurcation of the right upper lobe bronchus, with an additional bronchus branching directly from the trachea to supply the upper lobe. In contrast, a displaced tracheal bronchus involves the transposition of the right upper lobe bronchus or one of its segments from the right main bronchus to the trachea [1,3].

While tracheal bronchi are often asymptomatic in adults, they are more frequently associated with respiratory complications in pediatric patients. For instance, in a study of 18 infants with tracheal bronchus, 5 required surgical resection of the right upper lobe due to recurrent pneumonia. Symptomatic patients may present with nonspecific respiratory complaints, including cough, wheezing, hemoptysis, dyspnea, and stridor, often accompanied by lung infiltrates suggestive of recurrent or persistent upper lobe pneumonia [4]. In the present case, the tracheal bronchus was implicated in recurrent episodes of pneumonia, culminating in the development of bronchiectasis within the affected bronchial segment.

Multidetector CT of the chest, complemented by three-dimensional reconstructions, is the gold standard for noninvasive diagnosis of tracheal bronchus. CT virtual bronchoscopy further enhances diagnostic accuracy by simulating endobronchial views derived from volumetric CT data. MinIP reconstructions, which enable the detection of low-density

structures in a given volume, are particularly useful for enhancing the visualization of bronchi and identifying subtle airway abnormalities. This imaging modality is also valuable for identifying associated congenital anomalies, such as vascular rings (e.g., double aortic arch), particularly in pediatric patients. Flexible bronchoscopy remains the definitive invasive diagnostic tool, enabling direct visualization of the tracheal bronchus opening and any concomitant airway abnormalities. Notably, up to 47% of tracheal bronchi may be overlooked on routine chest CT scans, highlighting the critical role of bronchoscopy in confirming the diagnosis [1,5].

Bronchoscopy should be prioritized in cases where clinical suspicion is high despite inconclusive imaging findings, or when detailed anatomical assessment is required for surgical planning.

Management of tracheal bronchus is tailored to the underlying condition and the severity of symptoms. Conservative treatment includes antibiotics for secondary infections, bronchodilators, expectorants, chest physiotherapy, and pulmonary rehabilitation. Special care is required during endotracheal intubation in these patients, as inadvertent placement of the tube into the tracheal bronchus or occlusion of its opening by the tube's cuff can lead to complications such as post-obstructive pneumonia, atelectasis, pneumothorax, inadequate ventilation, and hypoxemia. Fiberoptic bronchoscopy is recommended to guide safe intubation in such cases.

Surgical resection of the anomalous bronchus and affected lobe should be considered in patients with recurrent respiratory infections, severe bronchiectasis, or failure of conservative management. Thoracoscopic lobectomy and segmentectomy have been successfully performed in both pediatric and adult populations, demonstrating favorable outcomes. However, the presence of pleuropulmonary adhesions or associated vascular malformations can increase surgical complexity and the risk of hemorrhage, necessitating meticulous preoperative planning and imaging.

In conclusion, tracheal bronchus is a rare but clinically significant congenital anomaly that warrants a high index of suspicion, particularly in patients with recurrent respiratory infections or nonspecific symptoms. A multidisciplinary approach, incorporating advanced imaging, bronchoscopy, and surgical intervention when indicated, is essential for optimal patient management. Further research and long-term follow-up studies are needed to enhance our understanding of the natural history and treatment outcomes of this condition in adults [1,6].

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