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Coexisting bilateral tracheal bronchi and accessory cardiac bronchus complicated with pneumonia and empyema: a case report

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Abstract

Background Tracheal bronchus and accessory cardiac bronchus are rare congenital anomalies of the tracheobronchial tree. Tracheal bronchus is a congenital anomaly in which the bronchus supplying all or part of the upper lobe originates from the trachea, carina, or another bronchus, while accessory cardiac bronchus arises from the medial wall of the bronchus intermedius. To our knowledge, this is the first reported case from Africa describing the simultaneous occurrence of bilateral tracheal bronchi and accessory cardiac bronchus.

Case presentation A 45-year-old, non-smoking Ethiopian male of Halaba ethnicity presented with a chief complaint of a dry cough lasting 2 weeks. Chest examination revealed stony dullness and absent air entry over the right lower lung field. A non-contrast chest computed tomography scan showed right upper lobe pneumonia with empyema. Notably, the computed tomography scan also revealed bilateral tracheal bronchi supplying both the right and left upper lobes and an accessory cardiac bronchus. The patient was treated with broad-spectrum antibiotics and chest tube drainage for empyema and was discharged in an improved condition. Four months after discharge the patient returned to his pre-hospitalization activity level.

Conclusion This case highlights the importance of recognizing these congenital anomalies, especially in patients with recurrent respiratory symptoms, to ensure appropriate diagnosis, prevention, and management of associated complications.

Keywords Africa, Pneumonia, Empyema, Bilateral, Tracheal bronchi, Accessory cardiac bronchus, Coexisting, Primary hospital, Case report

Background

Herein we present an extremely rare combination of two rare congenital anomalies, bilateral tracheal bronchi and accessory cardiac bronchus, which are typically asymptomatic; however, tracheal bronchus can result in recurrent pneumonia, bronchitis, stridor, and wheezing, or can complicate intubation during anesthesia or mechanical ventilation. Conversely, accessory cardiac bronchus can present with recurrent infections or hemoptysis [1–3].

Case presentation

A 45-year-old, non-smoking Ethiopian male of Halaba ethnicity, with chronic venous insufficiency for the past 6 years on follow-up, presented with a chief complaint of dry cough for a duration of 2 weeks, associated with easy fatigue, exertional dyspnea, right-sided pleuritic chest pain, and weight loss. He also had bilateral lower limb edema extending to the level of the distal legs. The patient denied a history of fever, night sweating, loss of appetite,

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Table 1 Displaying complete blood cell count of our patient at presentation

Parameter (unit)	Result	Reference
WBC (10^9/L)	9.4	4–10
Neutrophils (%)	0.62	0.500–0.70
Lymphocytes (%)	0.36	0.200–0.60
Monocytes (%)	0.06	0.030–0.12
Eosinophils (%)	0.03	0.005–0.05
Basophil (%)	0.002	0.000–0.01
RBC count (10^{12}/L)	4.1	3.5–5.2
Hemoglobin (g\dL)	13.5	12–16
Hematocrit (%)	38.2	35–48
Platelet count (10^9/L)	240	150–500

Where g\dL represents grams per deciliter

Fig. 1 Demonstrating a purulent fluid drained from the right pleural space

alcohol consumption, or any other significant symptoms on systemic review. On examination, the patient's vital signs were within normal limits: heart rate = 94 beats/minute, respiratory rate = 18 breaths/minute, blood pressure = 116/88 mmHg, temperature = 36.9 °C, and oxygen saturation (SpO_2) = 96%. Chest examination revealed stony dullness and absent air entry over the right posterior two-thirds and anterior one-third. There was bilateral grade II pitting edema without significant skin changes. Other systems were unremarkable. Laboratory investigations showed a normal complete blood cell count (Table 1). Pleural aspirate was frankly purulent (Fig. 1) with a dipstick showing WBC = +4, protein = +3, and glucose negative. Gene Xpert testing on pleural aspirate did not detect *Mycobacterium tuberculosis*.

Chest X-ray showed a lenticular homogeneous pleural-based opacity compressing the right lung with a mediastinal shift to the left (Fig. 2A). Electrocardiography and echocardiography were normal and chest ultrasound showed retro-hepatic and supra diaphragmatic fluid collection with echo-debris content (Fig. 2B).

On chest computed tomography (CT) scan (Figs. 3, 4, 5), there was a right sided lobulated collection with peripheral enhancement and positive split pleural sign and bilateral tracheal bronchi supplying both right and left upper lobes, and accessory cardiac bronchus arising from the bronchus intermedius and ending without supplying the lung tissue. There was also right upper lobe round opacity with air bronchogram. A schematic representation of the patient's tracheobronchial tree is shown in Fig. 6.

The patient was treated with a 5-week course of empirical broad-spectrum intravenous antibiotics (ceftriaxone

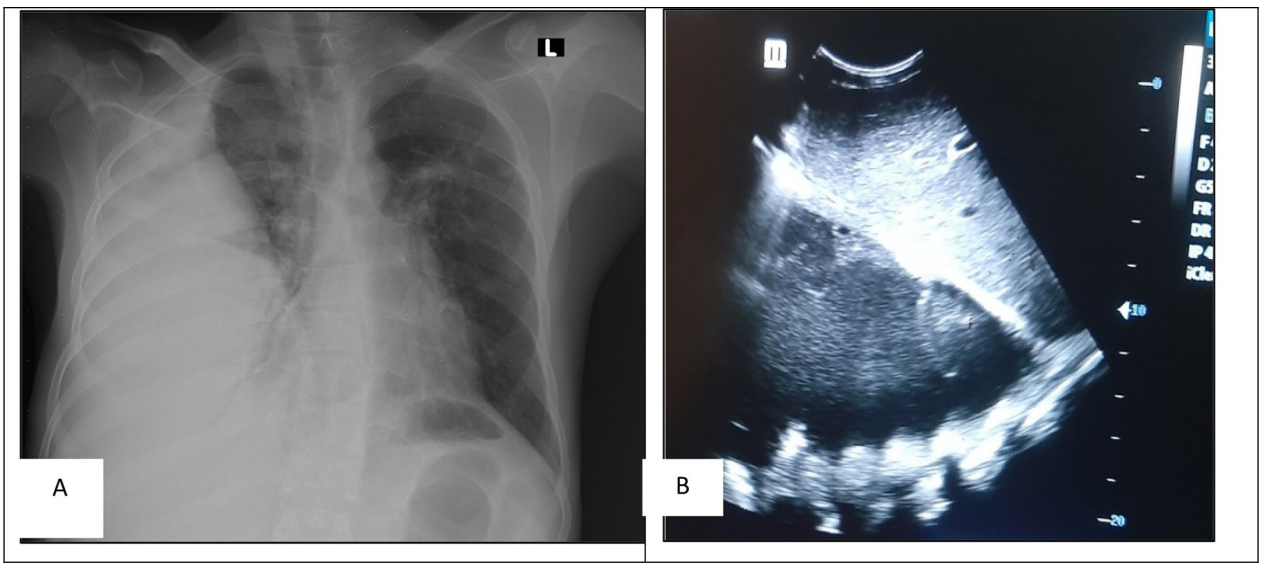

Fig. 2 Posteroanterior chest X-ray showing right sided biconvex homogeneous pleural-based opacity compressing the entire right lung with a mediastinal shift to the left (**A**) and (**B**) bedside chest ultrasound showing a retro-hepatic and supra diaphragmatic fluid collection with echo-debris content

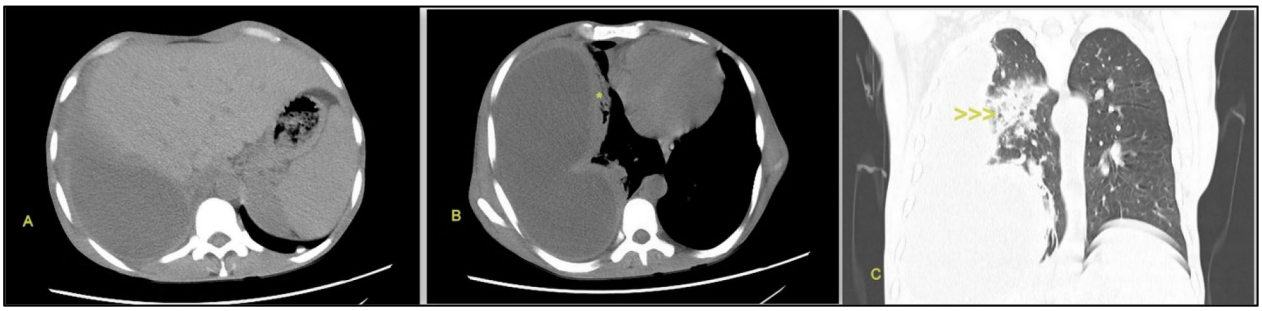

Fig. 3 **A**, **B** Axial plane non-contrast computed tomography scan showing right sided lobulated hypodense collection with peripheral enhancement and compressive atelectasis (*) of the right middle and lower lobes, and (**C**) coronal plane non-contrast computed tomography scan demonstrating right upper lobe round opacity with air bronchogram (triple arrow heads)

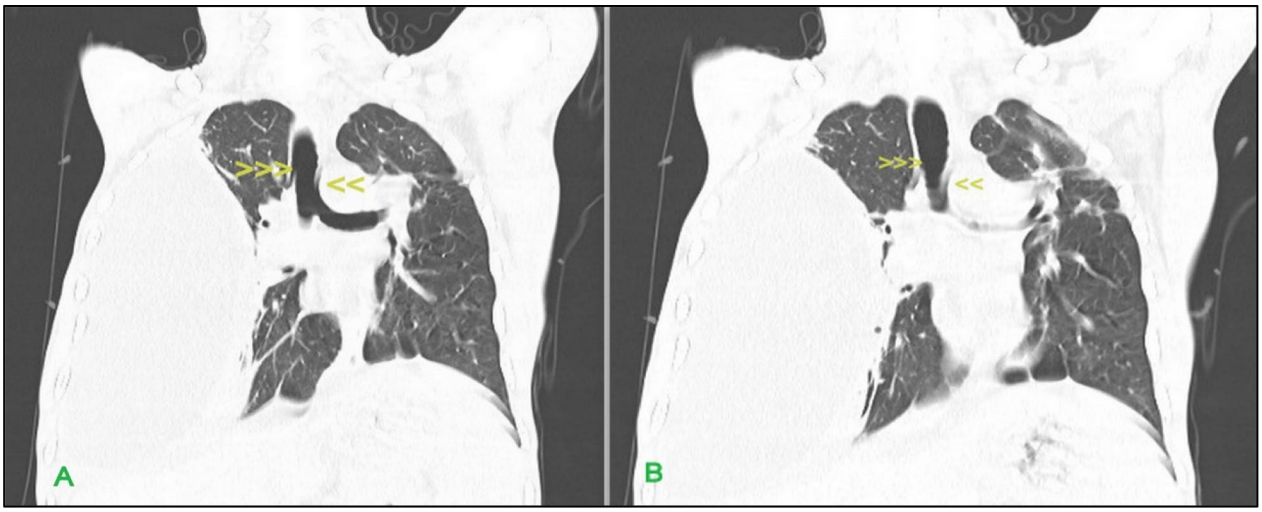

Fig. 4 **A**, **B** Coronal plane non-contrast computed tomography scan showing bilateral tracheal bronchi with the right (triple arrow heads) originating 2.3 cm from the carina and the left (double arrow heads) originating 1.2 cm from the carina

1 g intravenously twice a day and metronidazole 500 mg intravenously three times a day) and chest tube insertion, which drained approximately 3 L of pus. A follow-up chest X-ray (Fig. 7) showed an expanded right lung. The patient was discharged improved, but due to financial constraints, advanced investigations and interventions were not pursued.

Four months after discharge from the hospital, the patient, who had received a chest physiotherapy using an inflatable balloon (balloon-blowing exercise), remains asymptomatic during monthly follow-up visits and returned to his pre-hospitalization activity level.

Discussion

Tracheal bronchus and accessory cardiac bronchus are rare congenital anomalies of the tracheobronchial tree. Tracheal bronchus is a congenital anomaly in which the bronchus supplying the entire or part of the upper lobe originates from the trachea or carina, while the accessory cardiac bronchus arises from the medial wall of the bronchus intermedius [4, 5].

A meta-analysis found the prevalence of tracheal bronchus to be 0.99% higher in pediatrics (2.5%) than in adults (0.5%), and the estimated prevalence of cardiac bronchus is 0.14% [6]. A population-based study using multidetector row CT scan showed that tracheal bronchus has a prevalence of 0.9% with male predominance (0.6%), and found only one case (3.1%) with bilateral tracheal bronchi [7]. Although there are few reports, the simultaneous occurrence of these anomalies is exceedingly rare [1]. Our patient has an even rarer form of this anomaly, which is bilateral tracheal bronchi, with the right originating 2.3 cm from the carina and the left originating 1.2 cm from the carina, and has coexisting accessory cardiac bronchus.

Tracheal bronchus is an umbrella term that encompasses various bronchial arborization anomalies and is classified as either displaced (the only supply for the

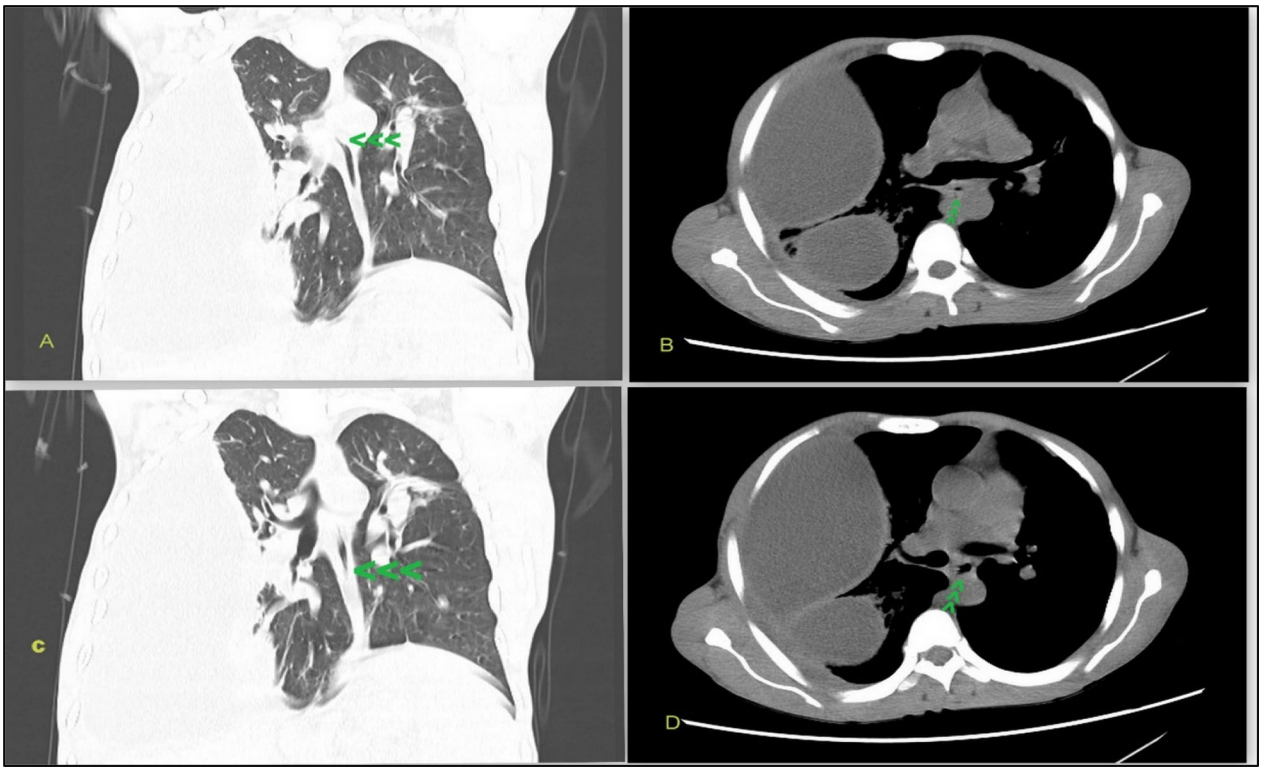

Fig. 5 (**A**) Coronal and (**B**) axial plane non-contrast computed tomography scan with the green arrow heads showing cardiac bronchus originating from the medial aspect of bronchus intermedius and descending medially and leftward ending blindly without supplying any lung tissue (**C**, **D**)

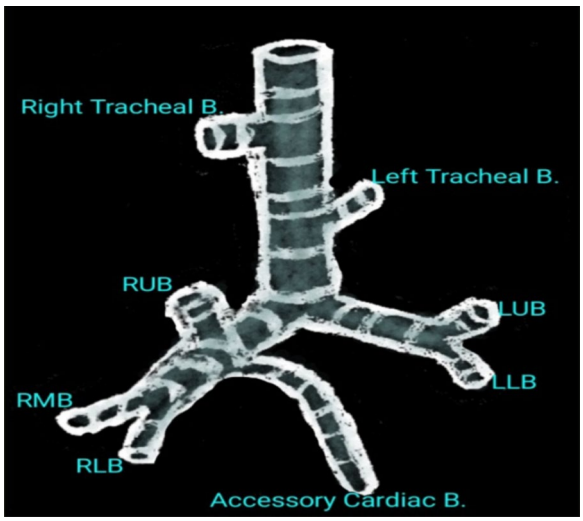

Fig. 6 A schematic representation of the patient's tracheobronchial tree. LUB, left upper lobe bronchus;, LLB, left lower lobe bronchus; RULB, right upper lobe bronchus; RMB, right middle lobe bronchus; RLB, right lower lobe bronchus

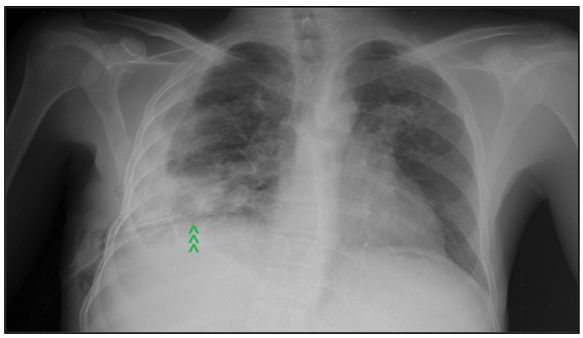

Fig. 7 Posteroanterior chest X-ray showing relative expansion of the right lung and chest tube *in situ* (triple arrow heads)

upper lobe) or supernumerary (with a normal bronchus) [7]. Another way of classifying this anomaly, which is most important during intubation, is Coacher's classification, which divides tracheal bronchus into type I: arises 2 cm above the carina and results in narrowing of the distal trachea; type II: originates 2 cm above the carina but does not result in narrowing of the distal trachea; and type III: fully developed within 2 cm of the carina. Type I is concerning during intubation, while types II and III can result in bronchial obstruction and unilateral ventilation [7, 8]. Our patient has type II tracheal bronchus on the right side and type III

on the left. Both the right and the left tracheal bronchi appears supernumerary.

These anomalies are usually asymptomatic, but tracheal bronchus can present during early childhood with recurrent pneumonia, bronchiolitis, stridor, wheezing, and prolonged atelectasis when intubated, and are reported to co-occur with different congenital associations and chromosomal anomalies, including congenital heart diseases, anomalous pulmonary artery, and Down syndrome [2]. Occurrence of bilateral tracheal bronchi is associated with congenital asplenia, while the accessory cardiac bronchus can present with hemoptysis or recurrent infection. The presence of these anomalous branches in the lungs causes a buildup of secretions, which, coupled with defective mucus clearance and bronchiectasis, creates an environment suitable for infection, ultimately leading to pneumonia [9–12]. Our patient does not have any of the aforementioned congenital anomalies or complications, except for upper lobe pneumonia, which is a common complication of tracheal bronchus. To our knowledge, there are no published reports on the association between these anomalies and chronic venous insufficiency.

The treatment for tracheal bronchus and accessory cardiac bronchus depends on the patient's specific presentation, ranging from observation alone for asymptomatic cases to surgical intervention for those who are symptomatic and refractory to medical therapy [13]. Pneumonia, a common complication linked to these anomalies, is categorized into distinct types: community-acquired pneumonia, healthcare-associated pneumonia, and ventilator-associated pneumonia. This classification directly influences the choice of empirical treatment [14].

Thoracic empyema, a life-threatening condition marked by pus accumulation in the pleural space, typically arises as a complication of pneumonia when bacterial infections spread to this area. Management focuses on eradicating infection, restoring lung expansion, and preventing complications [15, 16].

Antimicrobial therapy is tailored to the infection source: community-acquired cases often require combinations such as third-generation cephalosporins (e.g., ceftriaxone) with metronidazole for anaerobic coverage or beta-lactam/beta-lactamase inhibitors (e.g., amoxicillin–clavulanate), while hospital-acquired cases demand broader regimens targeting methicillin-resistant *Staphylococcus aureus* (MRSA) (e.g., vancomycin) and *Pseudomonas* (e.g., antipseudomonal agents such as piperacillin–tazobactam), alongside anaerobic coverage with metronidazole. Drainage via chest tube placement is essential to evacuate pus, though surgical interventions such as video-assisted thoracoscopic surgery may be needed for complex cases. For loculated effusions, intrapleural fibrinolytic agents (streptokinase, urokinase, or tissue plasminogen activator) help dissolve fibrin septations to improve drainage [15, 16].

Supportive care, including early nutritional support to address metabolic stress and pulmonary rehabilitation with breathing exercises and physiotherapy is critical to restore lung function and prevent chronic restrictive lung disease. Early diagnosis, aggressive antimicrobial therapy, timely procedural interventions, and multidisciplinary collaboration are vital to minimize mortality and long-term morbidity, ensuring optimal patient outcomes [16].

Conclusion

Although mostly asymptomatic, adult patients with tracheal bronchus can develop complications such as pneumonia and its complications. It is advisable to investigate for tracheal bronchus in patients with upper lobar or segmental pneumonia, especially if recurrent.

Abbreviations

CBC	Complete blood cell
CT	Computed tomography
g/dL	Grams per deciliter
HIPAA	Health Insurance Portability and Accountability Act
IV	Intravenous
mmHg	Millimeters of mercury
MRSA	Methicillin-resistant *Staphylococcus aureus*
PA	Posteroanterior
WBC	White blood cell

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Author contributions

BHT was involved in conceptualization, data curation, formal analysis, methodology, and writing. BDT was involved in data curation, formal analysis, and review. NKK was involved in data curation, investigation, and review. YMA was involved in data curation, investigation, and review.

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Availability of data and materials

All supporting data necessary to validate the findings of this case report are available upon request. These data have been de-identified in accordance with the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule and there is no reasonable basis to believe that the remaining information could be used to identify the individual.

Declarations

Ethics approval and consent to participate

Ethical approval for this report was granted by the hospital's ethics committee, chaired by the Chief Executive Officer.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interest
The authors declare that there are no conflicts of interest related to this case report.

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References

1. Jackson GD, Littleton JT. Simultaneous occurrence of anomalous cardiac and tracheal bronchi. J Thorac Imaging. 1988;3(1):59–60. https://doi.org/10.1097/00005382-198801000-00009.
2. McLaughlin FJ, Strieder DJ, Harris GBC, Vawter GP, Eraklis AJ. Tracheal bronchus: association with respiratory morbidity in childhood. J Pediatr. 1985;106(5):751–5. https://doi.org/10.1016/s0022-3476(85)80348-6.
3. Mishra M, Kumar A. Tracheal bronchus: a rare cause of recurrent pneumonia in adults. BMJ Case Rep. 2022;15(7): e250715. https://doi.org/10.1136/bcr-2022-250715.
4. Lawrence DA, Branson B, Oliva I, Rubinowitz A. The wonderful world of the windpipe: a review of central airway anatomy and pathology. Can Assoc Radiol J. 2015;66(1):30–43. https://doi.org/10.1016/j.carj.2014.08.003.
5. Doolittle AM, Mair EA. Tracheal bronchus: classification, endoscopic analysis, and airway management. Otolaryngol Head Neck Surg. 2002;126(3):240–3. https://doi.org/10.1067/mhn.2002.122703.
6. Wong LM, Cheruiyot I, de Oliveira MHS, Keet K, Tomaszewski KA, Walocha JA, *et al*. Congenital anomalies of the tracheobronchial tree: a meta-analysis and clinical considerations. Ann Thorac Surg. 2021;112(1):315–25. https://doi.org/10.1016/j.athoracsur.2020.08.060.
7. Lam K, Van HL, Anh LV. Tracheal bronchus and associated pathologies detected by multidetector-row computed tomography in the Vietnamese population. J Clin Imaging Sci. 2022;12:56. https://doi.org/10.25259/JCIS_56_2022.
8. Winters R, Soos MP. Tracheal bronchus. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK547715/.
9. Ming Z, Hong S, Biao J. Asplenia syndrome with bilateral tracheal bronchi. Circulation. 2008;118(2):196–7. https://doi.org/10.1161/circulationaha.107.763458.
10. Bentala M. Cardiac bronchus: a rare cause of hemoptysis. Eur J Cardiothorac Surg. 2002;22(4):643–5. https://doi.org/10.1016/s1010-7940(02)00431-1.
11. Zanetti G, Hochhegger B, Guimarães MD, Marchiori E. Accessory cardiac bronchus causing recurrent pulmonary infection. J Bras Pneumol. 2014;40(4):448–9.
12. Kuo C-W, Lee Y-C, Perng R-P. Tracheal bronchus associated with lung cancer. Chest. 1999;116(4):1125–7. https://doi.org/10.1378/chest.116.4.1125.
13. Barat M, Konrad HR. Tracheal bronchus. Am J Otolaryngol. 1987;8(2):118–22. https://doi.org/10.1016/s0196-0709(87)80034-0.
14. Burnham JP, Kollef MH. CAP, HCAP, HAP, VAP. Chest. 2017;152(5):909–10. https://doi.org/10.1016/j.chest.2017.05.002.
15. Elsheikh A, Bhatnagar M, Rahman NM. Diagnosis and management of pleural infection. Breathe (Sheffield). 2023;19(4): 230146. https://doi.org/10.1183/20734735.0146-2023.
16. Iguina MM, Sharma S, Danckers M. Thoracic empyema. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK544279.

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