Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Radiology

Pulmonary Sequestration in an Adult: A Radiological Challenge in the Diagnosis of an Atypical Cavitary Basal Lesion

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DOI: https://doi.org/10.36347/sjmcr.2026.v14i11.070 | **Received:** 22.09.2026 | **Accepted:** 12.11.2026 | **Published:** 18.11.2026

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Abstract | **Case Report**

Pulmonary sequestration is a rare congenital malformation with anomalous systemic arterialization that is frequently presented as an infectious or cavitary pulmonary disease. We report an unusual case of an intralobar sequestration—characterized by dual arterial perfusion to both dysplastic and normal parenchyma—in a 28-year-old male with a history of thoracic bullectomy presenting with subacute cough, chest oppression, and negative microbiological screening. While initial CT suggested an excavated lower-lobe lesion, thoracic contrast-enhanced computed tomography (CT) characterized a cystic lesion with a ground-glass halo and demonstrated an aberrant systemic feeder arising from the T10 aorta that supplied the sequestered mass, draining into the left inferior pulmonary vein.

Keywords: Bronchopulmonary Sequestration; Computed Tomography Angiography; Aorta, Thoracic.

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INTRODUCTION

The concept of pulmonary sequestration was first introduced by Pryce in 1946 [1]. He proposed a classification of three types of intralobar sequestration based on the distribution and vascular supply of the aberrant systemic artery.

Since Pryce's original description, numerous anatomical variants of pulmonary sequestration have been identified, including cases exhibiting dual venous drainage into both the pulmonary and systemic circulations. The term "sequestration spectrum" has therefore been introduced to encompass a wide range of congenital pulmonary abnormalities involving altered anatomical relationships between the four major components of the lung: the tracheobronchial tree, pulmonary parenchyma, arterial blood supply, and venous drainage [2]. Several other congenital thoracic anomalies share overlapping anatomical or vascular features with bronchopulmonary sequestration, including scimitar syndrome, congenital pulmonary airway malformation (CPAM), pulmonary arteriovenous malformations, and anomalous systemic arterial supply to otherwise normally developed lung tissue [3].

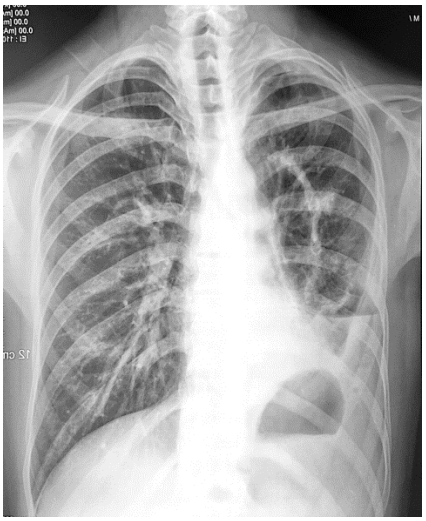


Fig. 1: Chest X-Ray showing a right basal cavitary lesion with an air–fluid level, associated with adjacent parenchymal opacity

CASE PRESENTATION

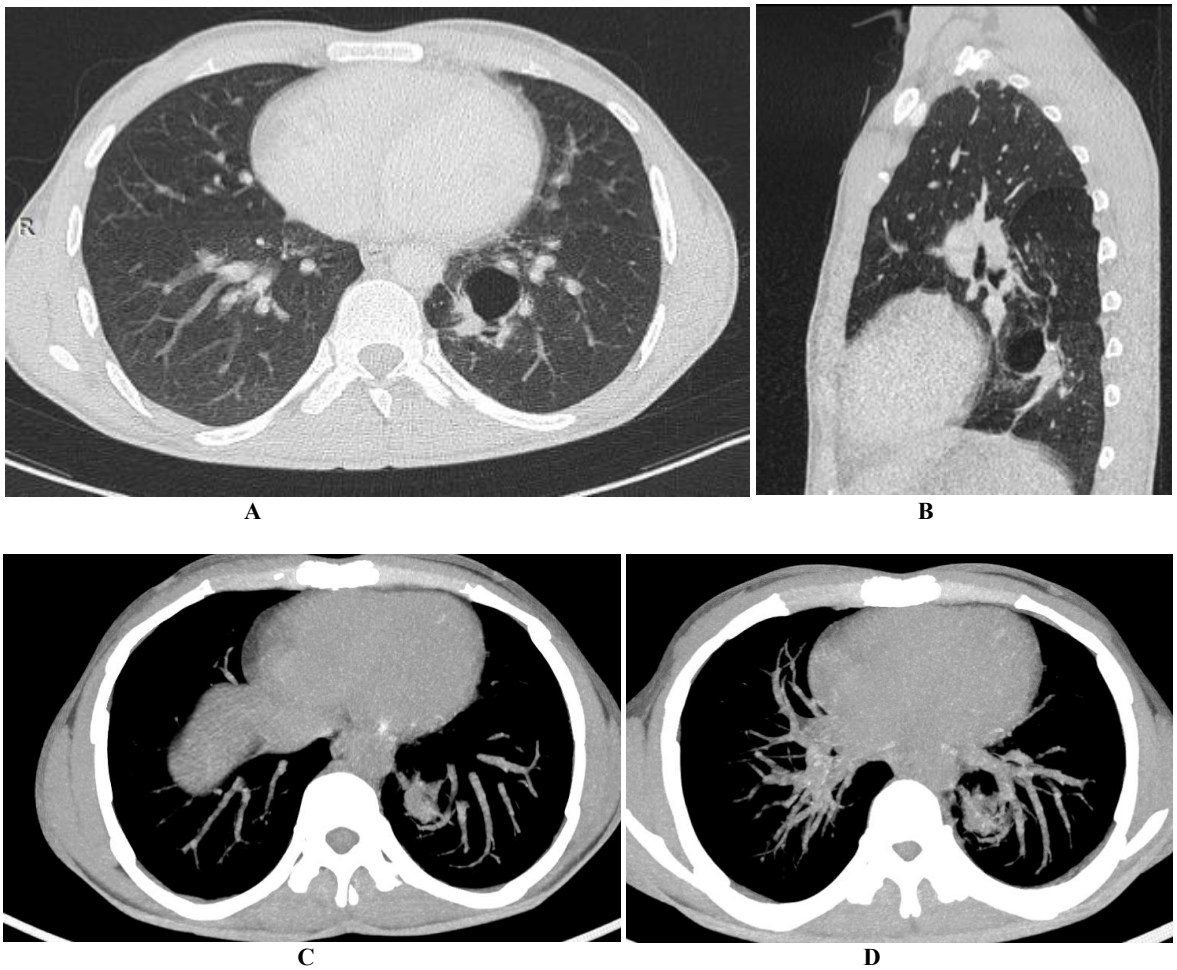
Clinical History and Laboratory Data

A 28-year-old male blacksmith presented with a 2-month history of subacute productive cough, chest tightness, and mild asthenia. He had a left thoracic bullectomy in 2021 for spontaneous pneumothorax. He was a non-smoker with no history of tuberculosis, toxic

exposure, or chronic pulmonary disease. Physical examination and laboratory studies (inflammatory markers, complete blood count) were strictly normal. Sputum GeneXpert MTB/RIF was negative.

Imaging Findings:

- **Chest X-Ray:** Ill-defined, heterogeneous left parahilar opacity ***(Fig. 1).***
- **Non-Contrast Chest CT:** Excavated cavitary lesion in the left medio-basal segment.
- **Thoracic contrast-enhanced computed tomography (CT):** Well-circumscribed, lobulated, thin-walled cystic mass in the left medio-basal segment, surrounded by a halo of ground-glass opacity (GGO) (***Fig.2 (A, B)***).
- **Arterial Supply:** Single systemic arterial feeder originating from the descending aorta at the T10 vertebral level. The artery had a slender origin and dilated distally (***Fig. 2 (C)***).
- **Venous Drainage:** Intralobar drainage into a tributary of the left inferior pulmonary vein (***Fig. 2(D***)).



A **B** **C** **D**

***(A)* Transverse plane, *(B)* Sagittal plane: CT images (lung window) showing an oval, well-defined, lobulated, thin-walled air-filled cystic lesion located in the left anteromedial basal segment, with a small peripheral focus of ground-glass opacity. *(C)* and *(D)*: Mediastinal-window maximum intensity projection (MIP) images demonstrating the vascular supply of the lesion. (C) A systemic arterial feeder arising from the descending thoracic aorta at the D10 level, with a narrow but patent proximal segment, extending towards the previously described lesion. (D) Venous drainage into the left inferior pulmonary vein**

DISCUSSION

On contrast-enhanced CT, pulmonary sequestration may exhibit a wide range of morphological appearances, including cystic lesions, mass-like opacities, well-defined lesions containing an air–fluid level, focal atelectasis, or bronchiectasis. These findings may mimic other pulmonary conditions, particularly hydatid cysts and lung abscesses. Rarely, an isolated emphysematous bleb in an atypical location has also been described[4]. This morphological variability, together with the potential overlap with other pulmonary abnormalities, may complicate radiological recognition and contribute to delayed diagnosis. Indeed, despite advances in CT angiography and other imaging techniques, preoperative diagnosis remains challenging. In a retrospective series of 72 cases, Xiao *et al.,* reported that 62.5% were diagnosed only after surgery [5].

Diagnostic challenges are even greater in cases of abdominal extralobar pulmonary sequestration, which may closely resemble retroperitoneal tumors. In the few adult cases reported, the diagnosis was generally established by histopathological examination of the surgical specimen [6–8].

Nevertheless, percutaneous biopsy is generally approached with caution because of the risk of severe hemorrhage related to the presence of aberrant systemic vessels [6,9].

Surgical resection, either lobectomy or segmentectomy, remains the standard treatment. Preoperative imaging guides surgical planning by delineating the pulmonary and vascular anatomy [10].

CONCLUSION

In adults presenting with nonspecific respiratory symptoms and atypical cystic pulmonary lesions, pulmonary sequestration should be considered in the differential diagnosis, particularly when an anomalous systemic arterial supply is suspected. Contrast-enhanced CT is essential for characterizing the parenchymal abnormality and delineating the aberrant arterial supply and venous drainage, thereby establishing the diagnosis and guiding surgical planning.

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