

## Case

## Intrapulmonary Sequestration Presenting with Hemoptysis in a Young Adult Female: A Rare Case Report

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## Abstract

Pulmonary sequestration is a rare congenital anomaly characterized by nonfunctional lung tissue that lacks communication with the tracheobronchial tree and receives its arterial blood supply from the systemic circulation. Although it is typically diagnosed in childhood, presentation in adulthood is uncommon and may pose diagnostic challenges. We report the case of a 23-year-old female patient who presented to the emergency department with massive hemoptysis of approximately 250 cc per day. Radiological evaluation, including computed tomography angiography, revealed findings consistent with intrapulmonary sequestration supplied by an aberrant systemic artery. The patient was successfully treated with endovascular embolization, resulting in complete resolution of hemoptysis. She was discharged in stable condition with a plan for elective thoracic surgical evaluation. This case highlights the importance of considering pulmonary sequestration in the differential diagnosis of hemoptysis in young adults and demonstrates the role of endovascular embolization as an effective and minimally invasive therapeutic option.

**Keywords:** Pulmonary Sequestration, Hemoptysis, Embolization, Therapeutic, Lung Diseases

## INTRODUCTION

Pulmonary sequestration is a rare congenital malformation characterized by the presence of nonfunctional lung tissue that lacks communication with the tracheobronchial tree and receives its arterial blood supply from the systemic circulation. Although it is primarily regarded as a disease of childhood, pulmonary sequestration may occasionally remain clinically silent and present later in adulthood, often following complications such as infection or hemoptysis. On radiologic evaluation, intralobar sequestration typically appears as a consolidation or mass, with or without cavitation, most commonly located in the lower lobes of the lung (1).

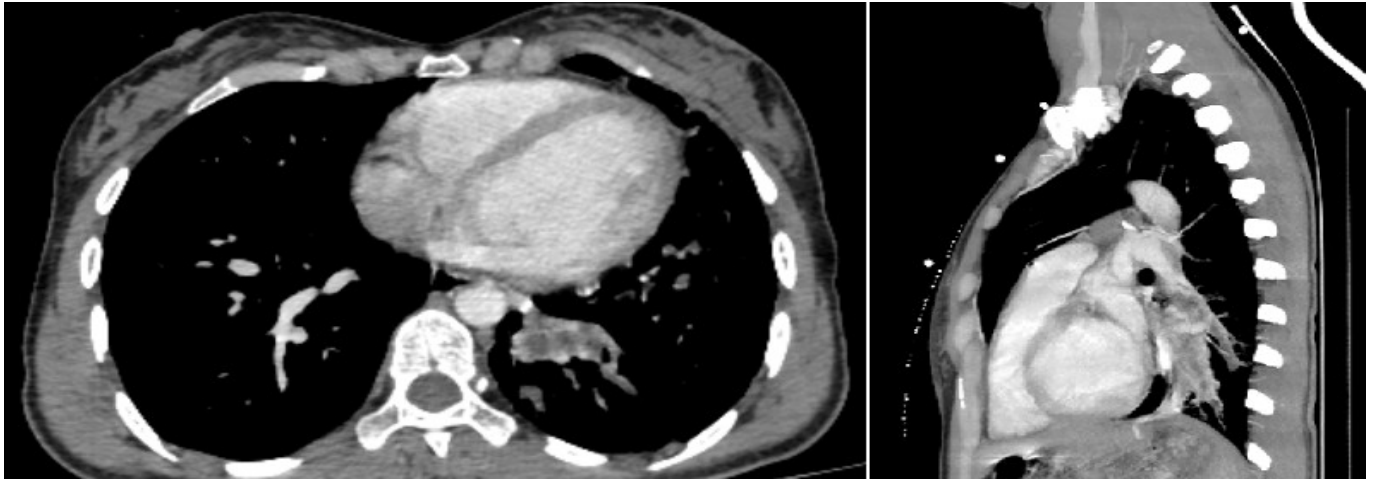
Pulmonary sequestration is classically categorized into intrapulmonary (intralobar) and extrapulmonary (extralobar) types. In intralobar sequestration (IPS), the sequestered segment is located within the visceral pleura of the lung, whereas extralobar sequestration (EPS) is anatomically separate from the normal lung parenchyma and enclosed within its own pleural covering. IPS represents approximately 75% of all reported pulmonary sequestration cases. The vast majority of cases (98%) are located in the lower lobes, with a clear predominance in the left lower lobe. Importantly, all reported cases of

IPS in the literature are situated above the diaphragm. The arterial supply most commonly originates from the descending thoracic aorta, accounting for approximately 73% of cases (2).

The clinical presentation of pulmonary sequestration is heterogeneous and may include recurrent pulmonary infections, chronic cough, or, less frequently, hemoptysis. Symptoms typically manifest before the age of 20; however, delayed presentation in adulthood, although rare, has been documented. In this case report, we present and discuss an adult patient diagnosed with intrapulmonary sequestration who presented with hemoptysis, highlighting the diagnostic considerations and therapeutic approach in this uncommon clinical scenario.

## CASE

A 23-year-old female patient presented to the emergency department with active hemoptysis amounting to approximately 250 cc per day. She denied accompanying symptoms such as cough, dyspnea, or chest pain. Her medical history was unremarkable, with no known chronic illnesses or regular medication use, and she reported no history of smoking, alcohol consumption, or illicit drug use. On admission, the patient was hemodynamically stable, and findings from the systemic



**Figure 1.** Contrast-enhanced axial and sagittal computed tomography images demonstrate a consolidation consistent with intralobar pulmonary sequestration, along with a tortuous vascular structure supplying the sequestered area.

physical examination were within normal limits. Laboratory investigations revealed a hemoglobin level of 13 g/dL (reference range: 11.1–15.4 g/dL) and an elevated C-reactive protein level of 45 mg/L (reference range: 0–5 mg/L), while coagulation parameters were within normal limits (PT/INR: 0.99).

Thoracic computed tomography angiography demonstrated nodular infiltrative areas, bronchiectatic changes, and ground-glass opacities in the lingula and lower lobe of the left lung, accompanied by peribronchovascular thickening. The pulmonary trunk and main pulmonary arteries were patent, and no filling defects suggestive of pulmonary embolism were identified in the distal branches. The lower lobe of the left lung appeared hypoplastic, with a centrally located area of irregular consolidation. This lesion was supplied by an aberrant systemic artery originating from the aorta at the level of the celiac trunk. Based on these clinical and radiological findings, a diagnosis of intrapulmonary sequestration was established (**Figure 1**).

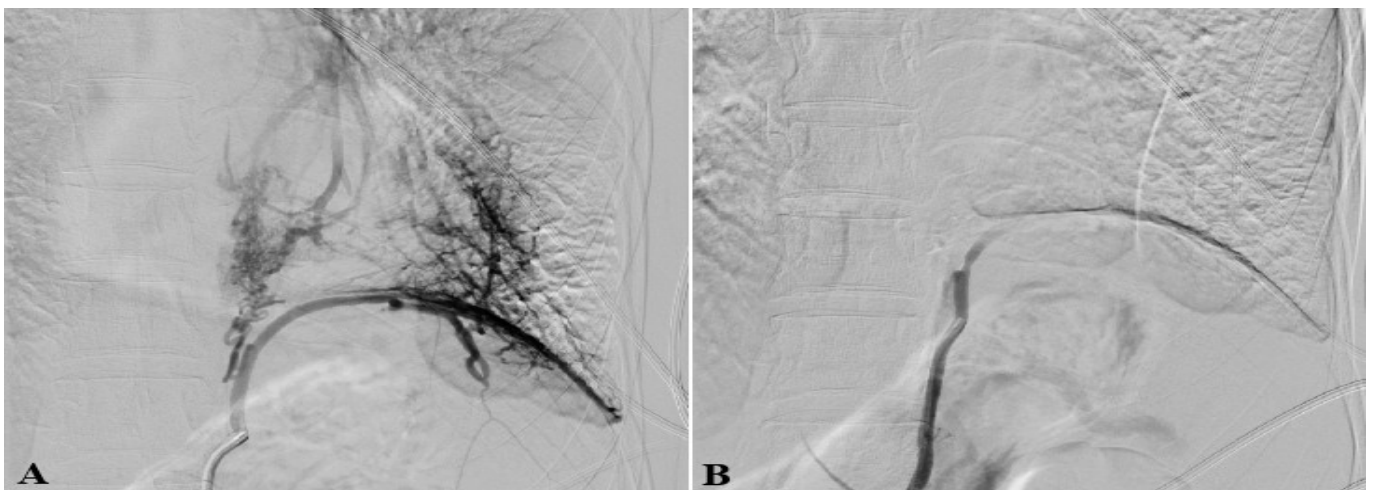
Subsequently, catheter angiography was performed, during which supraselective catheterization of an aberrant feeding artery originating from the phrenic artery was achieved. Complete embolization was performed using

500–700  $\mu$ m particles. In addition, collateral arterial supply to the sequestered segment from another branch of the phrenic artery was identified and embolized during the same session. Post-procedural control angiography confirmed successful occlusion of all feeding vessels. During the follow-up period, the patient experienced mild left arm pain lasting approximately two days, which gradually resolved. On the second post-procedural day, a single episode of fever (38.3°C) was recorded, which did not recur. No further complications were observed (**Figure 2**).

During follow-up, the patient did not experience recurrent hemoptysis and was discharged in stable condition with recommendations for outpatient follow-up and elective evaluation by the thoracic surgery department.

## DISCUSSION

Pulmonary sequestration is defined as nonfunctional lung parenchyma that lacks communication with the normal tracheobronchial tree and receives its arterial blood supply from the systemic circulation. Although the condition is most frequently diagnosed during childhood, some cases may remain asymptomatic and undetected until adulthood. In adult patients, the most common



**Figure 2.** (A); Angiographic image obtained before embolization showing the aberrant systemic artery supplying the sequestered lung segment. (B); Post-embolization angiogram demonstrating successful occlusion of the feeding vessel.

presenting symptoms include chronic cough, recurrent pulmonary infections, and hemoptysis. Hemoptysis may arise through several mechanisms, including infection of the sequestered lung tissue, chronic inflammatory changes leading to weakening of vessel walls, or rupture of aberrant systemic arteries supplying the lesion.

Thoracic computed tomography angiography plays a pivotal role in the diagnosis of pulmonary sequestration by providing detailed anatomical information regarding both the sequestered lung parenchyma and its systemic arterial supply. This imaging modality is particularly valuable for treatment planning, as it allows precise identification of feeding vessels and facilitates the selection of the most appropriate therapeutic approach, whether surgical or endovascular.

In recent years, endovascular embolization has emerged as a minimally invasive alternative to surgical resection or as a method of symptom control prior to definitive surgery. It offers a rapid and effective therapeutic option, especially in patients presenting with active hemoptysis. The therapeutic effect of embolization is achieved by occlusion of the aberrant feeding artery, resulting in cessation of blood flow to the sequestered segment. This interruption leads to ischemic changes within the abnormal lung tissue, followed by necrosis and subsequent fibrosis, ultimately contributing to regression of symptoms and loss of function of the sequestered lung segment (3).

The existing literature describes endovascular embolization as a safe and effective treatment option for symptomatic pulmonary sequestration (4–6). Although the procedure is generally well tolerated, reported complications include transient fever, access-site thrombosis, temporary limb ischemia, and non-target embolization. In addition, pleural effusion following embolization has been documented in previous case reports (7). Residual perfusion, recurrent symptoms, or revascularization of the sequestered segment may also occur after embolization. Nevertheless, the advantages of this approach—such as its minimally invasive nature, lower complication rates, and shorter recovery time—make it an attractive therapeutic option. Furthermore, some authors have suggested that preoperative embolization may serve as an adjunct to surgery by reducing intraoperative bleeding risk (8).

To our knowledge, there are currently no randomized controlled trials or large-scale comparative studies directly evaluating surgical resection versus endovascular embolization, particularly in adult patient populations. Therefore, further prospective studies are warranted to better define long-term outcomes, complication rates, quality of life, and symptom recurrence associated with different treatment modalities in patients with pulmonary sequestration.

## CONCLUSION

Although extracorporeal shock wave lithotripsy is widely regarded as a safe and effective treatment modality for renal stone disease, rare complications such as double-J ureteral stent fracture may occur, even in the setting of short-term stent placement. Clinicians should maintain a high index of suspicion when performing ESWL in patients with indwelling ureteral stents, particularly when higher shock wave frequencies are employed. Early recognition through appropriate radiographic evaluation and timely endoscopic intervention are crucial to prevent additional morbidity and ensure favorable clinical outcomes.

## DECLARATIONS

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**Author Contributions:** Zeynep Yılmaz Kaya contributed to the study conception, clinical evaluation, patient management, and manuscript drafting. Ali Burak Binboğa and Çetin Murat Altay performed radiological imaging, interpretation, and interventional planning, and critically revised the manuscript. Mehmet Onay contributed to the interventional procedures, data interpretation, and manuscript review. All authors approved the final manuscript and take responsibility for the integrity of the work.

**Competing Interests:** The authors declare no conflict of interest.

**Consent Statement:** Patient consent was obtained.

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