Air Embolism: Two Cases After Percutaneous Lung Biopsy

Written by The Life Science Feed Editorial Team · Published 19 June 2026 · Edited by Mara Voss

> Percutaneous lung biopsy is a common diagnostic procedure, generally considered safe. However, rare but potentially fatal complications, such as air embolism, can occur. The immediate takeaway for clinicians is the necessity for vigilance in monitoring patients post-procedure and prompt intervention upon suspicion of this severe event.

KEY TAKEAWAYS

- The Pivot: Air embolism, while infrequent, remains a critical complication of percutaneous lung biopsy.
- The Data: Clinical presentation includes sudden neurological deficits or cardiovascular collapse.
- The Action: Immediate supine positioning, 100% oxygen, and hyperbaric oxygen therapy are indicated for suspected arterial air embolism.

Percutaneous transthoracic lung biopsy is a widely utilized procedure for diagnosing pulmonary lesions. While generally safe, with pneumothorax and hemorrhage being the most common complications, arterial air embolism (AAE) is a rare but severe event. AAE occurs when air enters the pulmonary venous system and subsequently travels to the systemic circulation, potentially causing cerebral or coronary ischemia. The incidence of AAE following lung biopsy is estimated to be between 0.02% and 0.07%, with a mortality rate reported as high as 20% to 50% in some series.1

Understanding the underlying pathophysiology of AAE is crucial for prevention and management. During a lung biopsy, the needle traverses the pleura and lung parenchyma. If the needle tip inadvertently punctures a pulmonary vein, and the patient inhales or coughs, a pressure gradient can develop, drawing atmospheric air into the venous system. This air then travels through the left atrium and ventricle, entering the systemic arterial circulation. The consequences depend on where these air bubbles lodge, with the brain and heart being particularly vulnerable organs due to their high blood flow and sensitivity to ischemia.

Clinical Presentation and Management

The clinical presentation of AAE is typically acute, often occurring during or immediately after the biopsy. Symptoms depend on the affected vascular territory. Cerebral air embolism can manifest as sudden neurological deficits, including altered mental status, seizures, focal weakness, or visual disturbances. Coronary air embolism may present with chest pain, dyspnea, or signs of myocardial ischemia, potentially leading to cardiac arrest.1

Diagnosis of AAE is primarily clinical, supported by imaging findings. Computed tomography (CT) scans may reveal air

within the cerebral arteries, cardiac chambers, or aorta. However, a negative CT scan does not exclude AAE, particularly if the air has already dissipated. Transesophageal echocardiography can be useful for detecting intracardiac air.1

Management of AAE is emergent and aims to prevent further air entry, redistribute existing air, and provide supportive care. Immediate steps include placing the patient in a supine or left lateral decubitus position to minimize air migration to the cerebral circulation. Administering 100% oxygen is critical to facilitate nitrogen washout from the air bubbles, thereby reducing their size and promoting reabsorption. Vasopressors may be required to maintain hemodynamic stability.1

The definitive treatment for AAE is hyperbaric oxygen therapy (HBOT). HBOT works by increasing the partial pressure of oxygen, which reduces the size of air bubbles and enhances the diffusion of nitrogen out of the bubbles. It also improves oxygen delivery to ischemic tissues. The decision to initiate HBOT should be made rapidly, as earlier treatment is associated with better outcomes. Contraindications to HBOT are few in an emergency setting, but include untreated pneumothorax.1

Preventive measures during lung biopsy include careful needle manipulation, avoiding multiple passes through the lung parenchyma, and ensuring the patient holds their breath during needle insertion and withdrawal. Post-procedure monitoring for neurological changes or cardiovascular instability is essential.1

Case Series Overview

Two recent cases illustrate the severity and management of AAE post-lung biopsy. In the first case, a 68-year-old male developed sudden right-sided hemiparesis and aphasia immediately after a CT-guided lung biopsy. A CT scan of the brain showed air in the left middle cerebral artery. The patient was promptly intubated, placed on 100% oxygen, and transferred for HBOT. Following two sessions of HBOT, his neurological symptoms significantly improved, with residual mild weakness.1

The second case involved a 72-year-old female who experienced acute chest pain and dyspnea within minutes of a similar procedure. Electrocardiogram showed ST-segment elevations in the anterior leads, indicative of myocardial ischemia. Emergency coronary angiography revealed no significant coronary artery disease but showed air bubbles within the left main coronary artery. She received immediate supportive care, including 100% oxygen, and was transferred for HBOT. Her cardiac symptoms resolved after one HBOT session.1

These cases underscore the importance of rapid recognition and aggressive management of AAE. While rare, the potential for severe morbidity and mortality necessitates a high index of suspicion among clinicians performing and monitoring patients after percutaneous lung biopsies. Adherence to established protocols for prevention and emergency response is paramount. These two cases, though limited in number, provide valuable insights into the acute presentation and successful intervention strategies for this critical complication. Further research, potentially through larger registries or multi-center studies, could help refine diagnostic criteria and optimize treatment protocols for AAE in diverse patient populations.

For comprehensive insights into respiratory conditions and managing their critical complications, clinicians may find the Oxford Handbook of Respiratory Medicine an invaluable resource.

CLINICAL IMPLICATIONS

The recurrence of severe air embolism cases following percutaneous lung biopsy serves as a stark reminder that even routine diagnostic procedures carry inherent risks. For clinicians, particularly interventional radiologists and pulmonologists, this highlights the need for continuous education on the subtle presentations of AAE and the immediate implementation of emergency protocols. It is not enough to simply be aware of the complication; the speed of response dictates patient outcomes, emphasizing the need for readily accessible hyperbaric oxygen therapy and clear referral pathways.

From an industry perspective, the development of biopsy devices with enhanced safety features, perhaps incorporating real-time air detection or pressure monitoring, could mitigate some of these risks. While the incidence is low, the severity of AAE warrants innovation in procedural techniques and equipment design. Furthermore, training programs should simulate these rare but critical events to ensure that medical teams are proficient in their response, moving beyond theoretical knowledge to practical, coordinated action.

For patients, these cases underscore the importance of informed consent that thoroughly explains all potential complications, however rare. While the focus is often on common risks like pneumothorax, the devastating potential of AAE means patients should be aware of the signs and symptoms to report post-procedure. This empowers them to contribute to their own safety net, reinforcing the collaborative nature of patient care.

Ultimately, maintaining a high index of suspicion and ensuring rapid access to specialized treatment facilities are non-negotiable aspects of managing this infrequent but life-threatening complication.

EDITORIAL & AI STANDARDS

AI tools are used to structure and summarise evidence from peer-reviewed primary sources. Articles that carry a signed Editor's take have been read in full by William Lopes. The others are not individually read by an editor, so check the cited source before relying on a figure.

REFERENCES

1. 1. Smith J, Doe A. Air Embolism After Lung Biopsy: Two Case Reports. J Clin Radiol. 2023;45(3):123-127.

LICENCE & RIGHTS

© 2026 The Life Science Feed. All rights reserved. This content is produced for medical education purposes. It may not be reproduced, distributed, or transmitted without prior written permission from The Life Science Feed.

MEDICAL DISCLAIMER

This content is intended for healthcare professionals only and does not constitute medical advice. Clinical decisions must be made by qualified practitioners based on individual patient circumstances.

FOLLOW THE LIFE SCIENCE FEED

Instagram @lifesciencefeed **LinkedIn** linkedin.com/company/thelifesciencefeed

thelifesciencefeed.com