Lung Biopsy as Rare Cause of Thromboembolic Stroke: A Case Report

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Patient: Male, 36-year-old
Final Diagnosis: Thromboembolic stroke
Symptoms: Hemianopsia • right sided weakness
Medication: —
Clinical Procedure: —
Specialty: Radiology

Objective: Unusual clinical course
Background: CT-guided lung biopsy is a routine procedure used to evaluate suspicious pulmonary lesions that may arise from malignancy or infectious etiology. Common complications such as pneumothorax, bleeding, and rare cases of air embolisms leading to stroke have been documented as well. It is reported that there is a 0.06-0.08% risk of air embolism resulting in stroke in patients undergoing CT-guided lung biopsy. However, other causes of ischemic stroke following lung biopsy should be considered.

Case Report: A 36-year-old obese man presented with chronic shortness of breath, intermittent fever, and night sweats. Chest CT showed multiple bilateral pulmonary nodules with basilar predominance, and laboratory test results that showed no acute infections, a negative TB QuantiFERON, and a normal transthoracic echocardiogram. Therefore, elective lung biopsy was performed to direct future medical therapy. Shortly after the procedure, the patient reported having right-sided vision loss and decreased sensation on the right half of his face, arms, and legs. Non-contrast CT of the brain showed no hemorrhage and no air intracranially. Therefore, following a Neurology consult, the stroke protocol was initiated, which resulted in tPA being administered. TPA use resolved the patient’s symptoms, with no signs of hemorrhage.

Conclusions: Air embolisms have commonly been the cause of strokes following CT-guided lung biopsies, which can be detected on CT brain with signs of air intracranially. However, our case presents an ischemic cause of stroke with no evidence of air embolisms intracranially. Multidisciplinary stroke team consultations and consideration of alternative causes of stroke following CT-guided lung biopsy can be lifesaving, as urgent medical therapy can be delayed without proper considerations.

Keywords: Embolic Stroke • Thromboembolism
Abbreviation: TPA – tissue plasminogen activator

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/935587
The majority of lung biopsies are for diagnostic purposes to determine if pulmonary lesions are infectious, inflammatory, or malignant [1]. Although uncommon, complications of lung biopsies include hemoptysis, pneumothorax, and rare cases of ischemic strokes caused by air embolism [1]. Other causes of stroke include thromboembolic stroke that develops from blood clot formation in the vasculature that travels to the brain, causing stroke. Our report presents an unusual pathophysiology of ischemic stroke following CT-guided lung biopsy.

Case Report

A 36-year-old morbidly obese man with prior gastric sleeve gastrectomy presented with chronic shortness of breath, intermittent fever, and night sweats. An outpatient CT scan of chest (Figure 1) demonstrated multiple bilateral pulmonary nodules with a basilar predominance. Additional evaluation included a normal transthoracic echocardiogram, negative coccidiomycosis, negative TB Quantiferon, and negative sputum and blood cultures. CT-guided lung biopsy was completed with a 17-gauge introducer needle and 18-gauge core biopsy needle (Figure 2), using moderate sedation and local anesthesia. The procedure was unremarkable, and post-procedure imaging showed only slight perinodular hemorrhage, without pneumothorax. Within 30 min after the procedure, he reported having abrupt right-sided inferior quadrantanopsia vision loss and right-sided numbness of the face, arms, and legs. A CT scan without contrast of the brain showed no acute changes and, specifically, no intracranial air (Figure 3A). A CT angiogram of the brain demonstrated no large-vessel occlusion or filling defect, and no vascular malformation. The chest portion of the exam showed no further hemorrhage and no pneumothorax, but demarcated the biopsied right lung nodule well, showing an internal vessel draining to the right inferior pulmonary vein (Figure 4).

Intravenous tissue plasminogen activator (tPA) was administered per the weight-based stroke protocol, which restored the majority of the vision loss, with resolution of the right-sided numbness. The following day, MRI (Figure 3B) showed 2 adjacent punctate acute infarcts in the left occipital lobe periphery, correlating with the primary visual cortex, with no corresponding hemorrhage (Figure 3B). Cardiac evaluation demonstrated no evidence of atrial fibrillation, with telemetry and transesophageal echocardiogram demonstrated no vegetations or atrial thrombus, and a negative bubble study. The lung biopsy pathology report noted acute and chronic inflammatory infiltrates but showed no malignancy, no sign of tuberculosis, and no definitive abnormal hematologic populations. The patient was discharged several days later on aspirin, high-dose statin, and occupational therapy for residual eye fatigue.

One month later, the patient returned with progressive shortness of breath. Direct Coombs IgG was positive, and the patient was diagnosed with warm autoimmune hemolytic anemia, a known cause of hypercoagulability, as well as a condition associated with increased incidence of thromboembolic events [2].
Complications of lung biopsies have been well documented in the literature, including hemoptysis, pneumothorax, and rare cases of cerebrovascular accident [1]. Strokes as a complication are very rare and most are air emboli, with a risk of 0.06-0.08% [3]. Suspicion for cerebral air embolism is warranted when patients present with focal neurologic changes following lung biopsy procedures and supported by visualization of air intracranially on MRI or CT [4,5]. Additionally, if indeed a patient experienced an air embolism, a CT scan would detect even the smallest amounts of air due to air’s negative 1000 Hounsfield units, which creates a large contrast with brain parenchyma. However, our patient’s course suggested a thromboembolic etiology. Immediately following our patient’s stroke, a CT scan showed an absence of intracranial air, providing suspicion for a non-air embolic stroke. An intracranial septic embolus can be also considered, especially given the nodule’s traversing vessel sign, which is a finding of septic pulmonary emboli [6]. However, imaging and laboratory values indicated the patient had no ongoing infection, with no cardiac valvular or septal defects. Considering the patient had no ongoing infection, the traversing vessel is a pulmonary vein with

Discussion

Figure 3. (A) Non-contrast CT head shows no acute hemorrhage or other acute abnormality. Specifically, given the immediately preceding lung biopsy and visual symptoms, no air was identified in the occipital regions. (B) Diffusion-weighted sequence from the MRI brain shows a punctate focus of restricted diffusion in the left occipital lobe, consistent with a punctate infarction.

Figure 4. Contrast-enhanced CT of the chest performed at the time of stroke shows “traversing vessel sign” commonly seen with septic emboli. Notably, the blue arrowhead shows a vessel leading to the right inferior pulmonary vein.
a direct pathway to the left atrium. Considering the timing of the stroke after biopsy, there is a much stronger possibility of a thromboembolic etiology than intracranial septic embolus.

For these reasons, the multidisciplinary stroke team decided to administer tPA, the medical protocol for non-hemorrhagic strokes. There is a higher risk of hemorrhage with administration of tPA in intracranial septic embolus, but again, this alternative differential was felt to be less likely [7]. The benefit of preserving an eloquent area, the visual cortex, in a relatively young patient outweighed the risk of possible intracranial hemorrhage.

The restoration of vision and improvement of symptoms after treatment provide support for a thromboembolic cause. Our proposed pathophysiology is likely related to trauma of the biopsied pulmonary nodule, resulting in a thrombus of the traversing vessel, a pulmonary vein, leading to the left atrium on imaging, and ultimately embolizing to the left occipital lobe, thus producing our patient’s symptoms. Additionally, unknown to us at the time, our patient was hypercoagulable, which also contributed to this extremely rare type of stroke after biopsy.

Conclusions

In conclusion, there are limited case reports of lung biopsy procedures resulting in thromboembolic events as a cause of ischemic stroke. Physicians should have increased awareness of this possibility, and consultation with multidisciplinary stroke teams should be completed in any acute neurological events associated with lung biopsies to avoid delay of treatment.

Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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