Acta Scientific MEDICAL SCIENCES (ISSN: 2582-0931)

Volume 8 Issue 3 March 2024

Case Report

# Utility of Tc 99m Lung Perfusion Scan for Diagnosis of Pulmonary Thromboemboli After Endobronchial Valve in a Case of Lobar Emphysema

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**Received:** July 18, 2023

**Published:** February 08, 2024



## Abstract

**Introduction:** Pulmonary embolism is a treatable condition however the diagnosis is challenging. It could be more complicated in patients with underlying cardiac and lung parenchymal diseases.

**Case Presentation:** A 66-year-old COPD presented with left hemithorax chest pain and a recent history of valve implantation by flexible bronchoscopy and chest tube insertion due to pneumothorax. Despite the low probability for PE based on lung perfusion study, due to high clinical suspicious, CT angiography performed and there was no pulmonary embolism.

**Conclusion:** This case emphasizes the need to correlate lung perfusion scan with CT or X-Ray results to avoid misinterpretation when assessing perfusion defects.

**Keywords:** Pulmonary Interstitial Emphysema; Lung Perfusion Scan; Pulmonary Thromboemboli; Valve

## Introduction

Pulmonary embolism (PE) is a treatable disease caused by thrombus formation in the lung-vasculature, commonly from the lower extremity's deep veins compromising the blood flow to the lungs [1]. Undiagnosed massive PE can be fatal if not diagnosed and treated in a timely fashion. The diagnosis of PE is based on imaging. Lung perfusion scan is the most common and widely practiced testing modality to diagnose pulmonary embolism [2]. PE diagnosis is complicated by the fact that the body normally shunts blood away from areas of the lung that are not properly ventilated. This means that causes other than PE can also lead to regions of decreased perfusion [3]. Most commonly these are lung diseases, such as emphysema, interstitial lung disease, and asthma. Comparing CT scan to the perfusion pattern can help determine whether the diagnosis is PE [4]. CT scan will demonstrate normal pattern in the areas of perfusion deficit from the embolus, resulting in a "mismatched" defect [5]. Airway diseases, on the other hand,

show abnormalities on CT scan that coincide with the perfusion defects. These "matched" defects are unlikely to be caused by an acute PE. The stripe sign refers to linear activity seen at the pleural surface of a proximal perfusion defect. Because pulmonary emboli are typically pleura based, the stripe sign suggests another diagnosis, often emphysema. Rarely, in the resolution of pulmonary emboli, a stripe sign can be seen as circulation is restored [6].

Pulmonary emphysema is abnormal permanent enlargement of the airspaces distal to the terminal bronchioles with destruction of the alveolar wall without fibrosis. Emphysema is one of the entities grouped as chronic obstructive pulmonary disease. Emphysema is best evaluated on CT, although indirect signs can be noticed on conventional radiography in a proportion of cases [7,8]. In this case we discuss about a patient that referred for diagnosis of thromboemboli but he had emphysema in areas of matched defects in lung perfusion scan. These defects in lung perfusion scan must be correlate with CT scan, X ray or ventilation scan to avid from misinterpretation.

## Case Presentation

A sixty-six-year-old male heavy smoker and opium addict with a history of COPD who was treated with nasal spray and oxygen was admitted at rasoole akram hospital for exacerbation of dyspnea from FCI to FCIII from 2 weeks ago and pleuretic chest pain in left hemithorax, dry cough and weight loss.

While there was no previous history of chest pain, fever, chills and hemoptysis.

The patient has a history of lung volume reduction procedure via valve implantation by flexible bronchoscopy as a mechanical approach to counteract the effect of hyperinflation, besides there is a history of previous pneumothorax and insertion of chest tube.

The patient underwent evaluation for CAD and ischemia with myocardial perfusion imaging (MPI) and the result was negative for stress-induced ischemia.

The chest x-ray demonstrates paucity of the vasculature in the right upper lobe consistent with emphysematous changes (Figure 1).

To rule out pulmonary embolism pulmonary CT angiography was performed which was normal.

Tc 99m lung perfusion scan demonstrated low probability for pulmonary thromboembolism (Figure 2).

Lung CT scan demonstrated centriacinar emphysematous changes throughout upper lobes bilaterally and in some extent in apical segments of left lower lobe.

As a mechanical approach to counteract the effect of hyperinflation the patient has been gone under volume reduction procedure via valve implantation by flexible bronchoscopy (Figure 3).

Because of weight loss endoscopy and colonoscopy evaluation was done and results were negative.

No abnormal finding was detected in laboratory results including CBC, LFT and electrolytes.


**Figure 1**

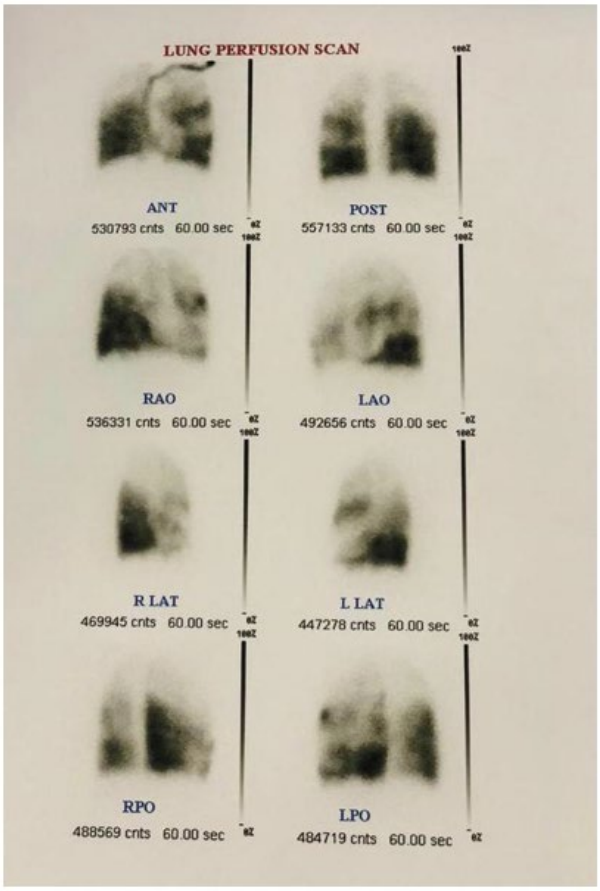


**Figure 2**

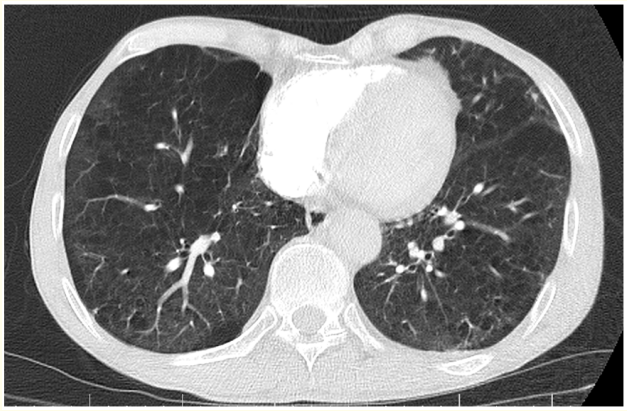

**Figure 3**

## Conclusion

There are many states other than acute PE that may cause a lobar perfusion defect. There are conditions that associated with matched defects include COPD, emphysematous changes, bleb or bullae, bronchogeniccarcinoma, mucous plug, radiation therapy, bronchiectasis, pulmonary contusion, and pulmonary edema. In this patient, correlation with the CX-ray and CT scan identified matched defects that not only excludes PE but also narrows the differential diagnosis. Radiographic and CT scan correlation in this patient demonstrates emphysematous change as an explanation to perfusion defects shown in nuclear imaging and there was no perfusion defect without underlying parenchymal changes. Therefore, as rule out the pulmonary thromboembolism as a significant cause of preventable in-hospital mortality is critical and of a clinical significance [9], the perfusion scan can be used to exclude PE despite the diffuse abnormality and even after lung volume reduction seen on the radiography or CT scan.

There was no funding.

There were no conflicts of interest.

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