

Spurious lung perfusion ventilation defect on planar ventilation-perfusion scan detected by SPECT imaging

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ABSTRACT

Pulmonary embolism (PE) is a preventable cause of morbidity and mortality which needs prompt recognition. Ventilation-perfusion (V/Q) scan is a well-established diagnostic test for evaluation of suspected PE. We report a 32-year-old woman with history of rheumatologic disease and acute dyspnea, who was referred for V/Q scintigraphy. The planar images revealed multiple mismatched defects throughout both lungs. SPECT images showed that only one of the defects was real, the others were caused by patient's elevated right arm. Our case showed a V/Q pitfall with emphasis on importance of SPECT imaging in V/Q scintigraphy.

Key words: Ventilation-perfusion scan; SPECT; ^{99m}Tc -MAA; ^{99m}Tc - DTPA

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INTRODUCTION

Pulmonary embolism is a life-threatening cardiovascular disease [1, 2], that needs instant diagnosis and treatment to reduce morbidity and mortality [3, 4]. PE diagnosis is typically proved by imaging, which currently is based on the use of V/Q scintigraphy or multi-detector pulmonary CT angiography [2]. V/Q scan is one of the first diagnostic test used for suspected PE cases [5]. Using ^{99m}Tc -MAA (Macro Aggregated Albumin) for lung perfusion scintigraphy is applied in three main techniques: planar imaging, SPECT and SPECT/CT. Due to the higher sensitivity and specificity of SPECT, V/Q SPECT is preferred over V/Q planar imaging [2]. We report a pitfall of V/Q planar scintigraphy which was detected by SPECT imaging.

CASE PRESENTATION

A 32-year-old woman with history of systemic lupus erythematosus and pulmonary hypertension presented with acute dyspnea. V/Q scan was done to evaluation

of suspected PE. After IV injection of 4 mCi (148 MBq) ^{99m}Tc -MAA, planar perfusion scan was obtained and revealed two large wedge-shaped defects in the right middle lobe and left upper lobe in anterior and right posterior oblique (RPO) views respectively. Also, another perfusion defect was noted in the anterior segment of the right middle lobe in right lateral (RL), RPO and left anterior oblique (LAO) views (Figure 1). Perfusion SPECT showed a segmental defect in the anterior segment of the right middle lobe which was compatible with mentioned planar defect in RL, RPO and LAO views. Unlike the planar images, SPECT images didn't show any other perfusion defect throughout the lungs (Figure 2). After 24 hours the ventilation scan with ^{99m}Tc -DTPA (Diethylene Triamine Pentaacetic Acid) was done and showed uniform tracer uptake throughout both lungs (Figure 1). After reviewing the rotating raw images, inappropriate right arm position was noted during perfusion acquisition which caused mismatched defects in both lungs (Figure 3).

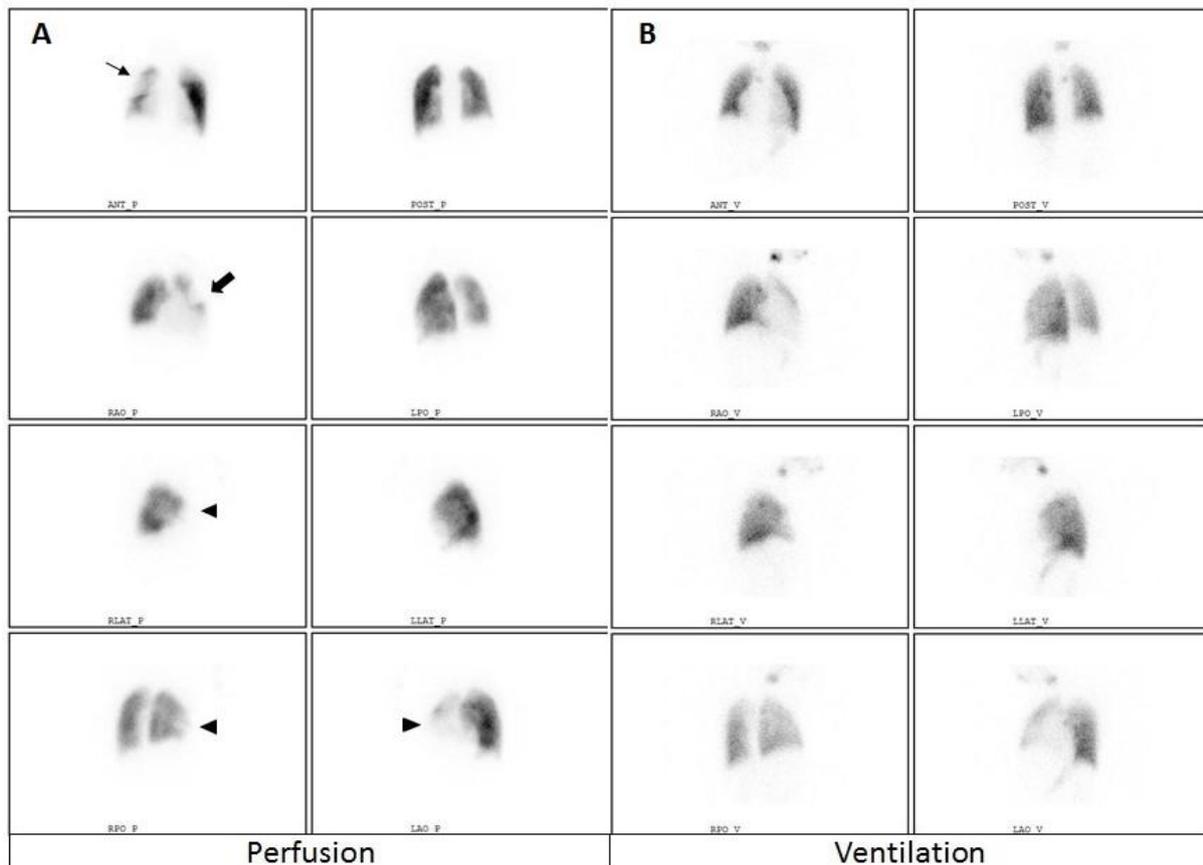


Fig 1. Perfusion scan showed two similar defects in the right middle lobe and left upper lobe in anterior view (A, small arrow) and RPO view (A, large arrow) respectively. Also, another defect was noted in the anterior segment of the right middle lobe in RL, RPO and left LAO views (A, arrowheads). The ventilation scan showed uniform tracer uptake throughout both lungs (B).

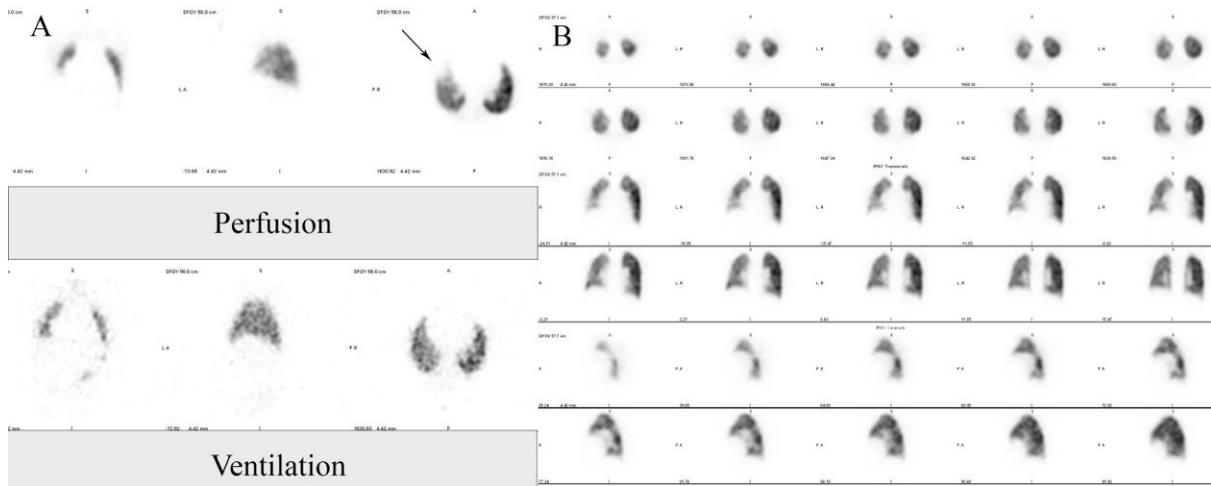


Fig 2. V/Q SPECT showed one segmental mismatched defect in the anterior segment of the right middle lobe (A, arrow) and it didn't show any other perfusion defect throughout the lungs (B).

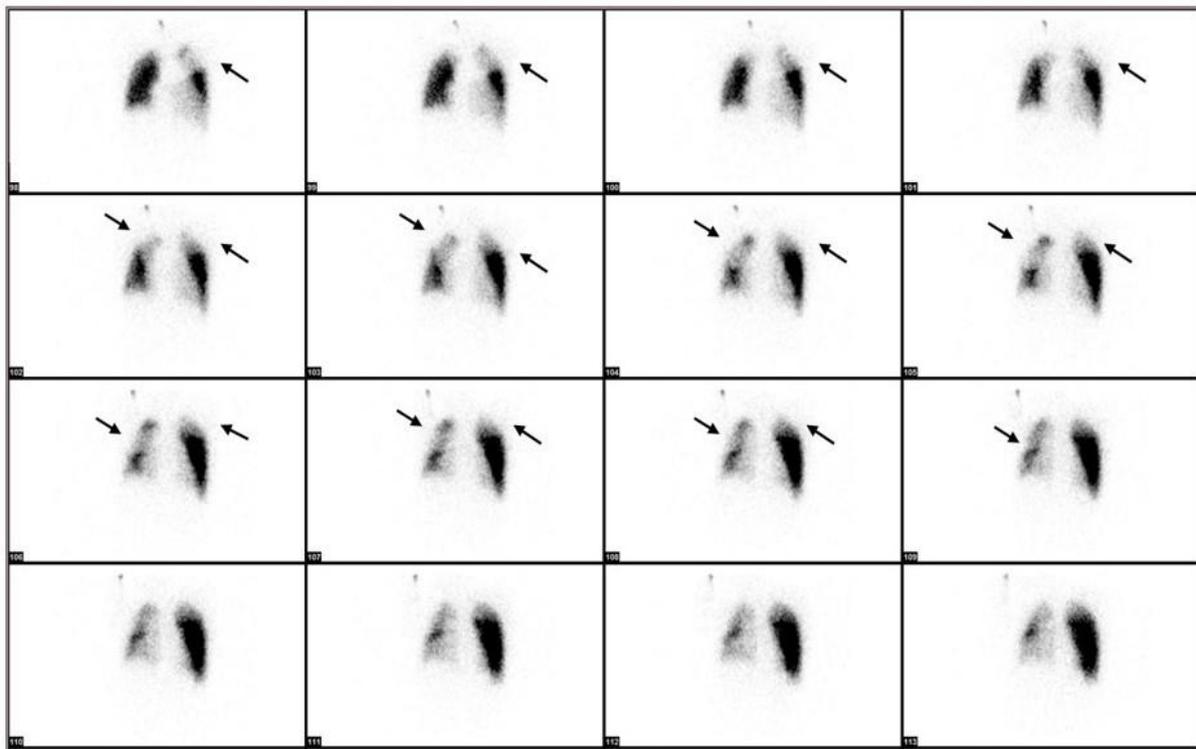


Fig 3. Inappropriate right arm position was noted in the rotating raw images during perfusion acquisition (arrows).

DISCUSSION

There are some known pitfalls for V/Q scan including heart failure, post-radiation fibrosis or pneumonitis, mediastinal lymphadenopathies and lung cancer, which can cause mismatched defects. These defects are often non-segmental [6]. Jewelry, metal objects, or other attenuating material in the field of view of the gamma camera can also cause spurious perfusion defects on the planar images [7]. These spurious

defects can be detected by SPECT imaging. V/Q SPECT also has higher sensitivity and specificity compared to the planar imaging [2, 8, 9] and can be helpful for better evaluation of segmental mismatched defects [6]. In our case, reviewing the SPECT images showed the true nature of mismatched defects in the lungs. Recognition of V/Q scan pitfalls is important to avoid misdiagnosis of PE and reducing the false positive cases.

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