Compression of the Right Pulmonary Artery by a Massive Descending Aortic Aneurysm Causing Bilateral Perfusion Defects on Pulmonary Scintigraphy

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Received: 16 March 2011 / Revised: 28 May 2011 / Accepted: 11 July 2011 / Published online: 5 August 2011
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Abstract A 67-year-old woman, who presented with a 2 month history of dyspnea, had a ventilation and perfusion lung scan that showed absent perfusion of the entire right lung with normal ventilation, as well as a rounded matched defect in the left lower lung adjacent to midline, suspicious for an aortic aneurysm or dissection. CT pulmonary angiography revealed a massive descending aortic aneurysm compressing the right pulmonary artery as well as the left lung parenchyma, accounting for the bilateral perfusion scan defects. We present the Xe-133 ventilation, Tc-99m MAA perfusion and CT pulmonary angiography imaging findings of this rare case.

Keywords Unilateral absent perfusion · Descending aortic aneurysm · Ventilation and perfusion scan · VQ scan · CT pulmonary angiography

Introduction

Unilateral absent perfusion in a normally ventilated lung is a very uncommon finding on ventilation perfusion (V/Q)

scintigraphy, accounting for about 2% of all V/Q lung scans. Less than a quarter of these are due to pulmonary embolism [1]. Although there is a wide variety of both vascular and extrinsic non-vascular causes of unilateral absent lung perfusion [2–5], none are as potentially dangerous and lethal as aortic dissection or a large aortic aneurysm [6–9]. Only a handful of such cases have been reported in the literature, however, none were detected based on bilateral V/Q lung scan findings. We present the first description of bilateral V/Q lung perfusion defects that suggested a potentially lethal cause of absent unilateral lung perfusion.

Case Report

A 67-year-old woman with no significant past medical history presented with a 2 month history of dyspnea and was referred for a ventilation and perfusion lung scan (V/Q scan) to rule out pulmonary embolism. Ventilation was performed with Xe-133 and perfusion with Tc-99m MAA. The left and right posterior oblique views of the ventilation (Fig. 1a, b) and perfusion (Fig. 1c, d) images showed absent perfusion but normal ventilation of the entire right lung, as well as a large rounded matched ventilation and perfusion defect in the left lower lung just adjacent to midline that appeared to arise from the aorta (additional perfusion views are shown in Fig. 2). These findings raised a strong suspicion of an aortic aneurysm or aortic dissection, and the patient was referred for a CT pulmonary angiogram.

The transaxial views of the CT pulmonary angiogram showed a massive descending aortic aneurysm (with circumferential thrombus), measuring 7.8 cm in its greatest dimension, compressing the right pulmonary artery to a

This is a case report. There was no financial support for this research paper.

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Fig. 1 Xe-133 ventilation images with **a** left posterior oblique and **b** right posterior oblique views. Tc-99m MAA perfusion images with **c** left posterior oblique and **d** right posterior oblique views

very narrow slit, and compressing the mainstem bronchi but to a lesser extent (Fig. 3). The patient was re-injected with contrast, and additional views were obtained to rule out aortic dissection (Fig. 4).

Discussion

Unilateral absent perfusion in a normally ventilated lung is a rare finding on ventilation perfusion scintigraphy, accounting for about 2% of V/Q lung scans in one review of 607 consecutive lung scans, with pulmonary embolism accounting for 24% of these cases, and miscellaneous causes

accounting for 76% [1]. A wide range of vascular as well as non-vascular processes can produce this finding, including mediastinal or hilar masses, pulmonary artery tumors, bronchogenic carcinoma, malignant mesothelioma, fibrosing mediastinitis, Takayasu arteritis, congenital heart disease shunt procedures, pulmonary saddle embolus [2], pulmonary artery agenesis [3], anomalous origin of the pulmonary artery [4], injection into Swan-Ganz catheter [5], ascending aortic dissection [6], ruptured aortic dissection with hematoma [7] and aortic arch aneurysm [8].

Because pulmonary embolism accounts for a minority of these cases, alternative possibilities have to be strongly considered to avoid a false positive diagnosis.

Fig. 2 Additional Tc-99m MAA perfusion images with **a** anterior, **b** posterior, **c** left lateral, and **d** right lateral views

Fig. 3 **a** Transaxial view from the CT pulmonary angiogram shows compression of the right pulmonary artery and **b** another transaxial view shows compression of the mainstem bronchi. **c** A sagittal view

shows compression of both the right pulmonary artery and right mainstem bronchus

Although absent unilateral lung perfusion caused by compression of a pulmonary artery by a descending aortic aneurysm has been described in one report [9], in that case there was no perfusion abnormality in the left lung arising from the aorta to suggest a dangerous and potentially lethal

cause of the unilateral absence of lung perfusion. In our highly unusual case, the descending aortic aneurysm also compressed the contralateral lung parenchyma, resulting in a matched rounded ventilation and perfusion defect in the left lower lung adjacent to the midline that appeared to arise

Fig. 4 The patient was re-injected with contrast and additional views were obtained to rule out aortic dissection. **a, b** Coronal views and **c, d** sagittal views show the extent of the descending aortic aneurysm and circumferential thrombus. There was no evidence of aortic dissection

from the aorta, which provided a clue to the underlying dangerous etiology and properly guided further investigation and management.

In conclusion, this case highlights the importance of carefully evaluating the ventilation and perfusion scintigraphic findings of the contralateral lung in a case of a unilateral absence of perfusion in a normally ventilated lung.

Conflict of Interest Statement We declare that we have no conflict of interest.

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