the patient’s immune status. In an immunocompromised patient, RHS with reticulation is highly suggestive of IFI. However, in an immunocompetent patient, this finding strongly suggests PI.

In conclusion, the RHS is increasingly recognized as a valuable imaging finding in several lung diseases. Careful analysis of the morphological characteristics of the RHS may narrow the differential diagnosis. The presence of nodular walls or nodules inside the RHS is highly suggestive of granulomatous disease, especially tuberculosis. Reticulation in the center of the halo suggests diseases or conditions that cause PI, IFI, and pulmonary embolism. The recognition of this tomographic finding may have important clinical implications, and indicates the need for additional angio-CT examination.

References


**Respiratory Failure Associated With Diaphragmatic Paralysis: Just a Ventilation/Perfusion Problem?**

**Insuficiencia respiratoria asociada a parálisis diafragmática: ¿solo un problema de ventilación-perfusión?**

To the Editor,

We report the case of a 75-year-old man with no significant medical history who presented with progressive dyspnea even on minimal exertion, some weeks after surgery for arthrodesis of the dorsolumbar spine.

On admission, elevation of the right hemidiaphragm was observed that was not present on previous radiographs, along with severe respiratory failure (pO₂ 49, pCO₂ 41) that showed little improvement after the administration of high-flow oxygen therapy, maintaining SpO₂ of 90%–91% with a face mask with reservoir bag. When the patient stood up, he developed tachypnea and SpO₂ fell to 84%–85%.

No signs of heart failure or respiratory failure were observed and right-sided paralysis of the diaphragm was confirmed with ultrasonography. Baseline laboratory tests were normal and a chest computed tomography with contrast ruled out pulmonary thromboembolism and parenchymal involvement, but revealed significant compression of the right atrium (RA) and partial atelectasis of the lower lobe of the right lung caused by the ipsilateral hemidiaphragm (Fig. 1A). Respiratory function tests showed a mild-moderate ventilatory limitation (FVC 76%, FEV1 64%, FEV1/FVC 65%), without impairment of CO diffusion capacity.

The absence of lung disease that would explain the severe hypoxemia, and the poor response to oxygen therapy led us to suspect a pulmonary or right-to-left cardiac shunt. Transthoracic echocardiogram revealed the immediate passage of bubbles to the left cavities through the interatrial septum after intravenous administration of agitated saline contrast, suggesting a probable patent foramen ovale (PFO). The heart chambers were not dilated and pulmonary pressures were normal. A transesophageal study was performed, showing an RA severely reduced by extrinsic compression, confirming the presence of a right-to-left shunt via a PFO (Fig. 1B and C).

Given the patient’s respiratory failure and symptoms consistent with platypnea-orthodeoxia syndrome, percutaneous closure

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**Fig. 1.** (A) Chest computed tomography with contrast medium: right atrial compression due to elevation of the ipsilateral hemidiaphragm (blue arrow). (B and C) Transesophageal echocardiogram: right-to-left shunt through the foramen ovale (passage of contrast medium to the left atrium — yellow arrow; color-Doppler — white arrow). (D) Amplatzer® device (red arrow).

AD: right atrium; AI: left atrium; Ao: ascending aorta; VCI: inferior vena cava.

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The patient was a non-smoker, on chronic antiplatelet therapy, with history of temporal arteritis, arterial hypertension, and non-Hodgkin MALT lymphoma of the right orbit diagnosed in July 2013, Ann Harbor IEA stage. He underwent chemotherapy with chlorambucil and prednisolone (8 cycles) and local radiotherapy (40 Gy), finishing treatment in May 2014 with residual mass. Although radiotherapy is the recommended treatment in this stage, chemotherapy is also considered effective in all stages of MALT lymphoma. In this particular case, since the patient was elderly and lived far from the hospital, the option requiring less dislocations was chosen. It was also decided that if he presented with non-responsive disease or incomplete response, he would then undergo local radiotherapy, which was in fact the case.

On admission, he had bibasal crackles on pulmonary auscultation, with no other significant findings in the physical exam. The nose and throat examination ruled out upper airway lesions and local invasion of the orbital lymphoma.

Laboratory data showed normal levels of hemoglobin, platelets and coagulation tests. The chest X-ray revealed loss of volume on the right lung, consistent with previous findings. Chest computed tomography (CT) angiography was performed revealing signs of sub-segmental pulmonary thromboembolism (PTE) and also a retro-tracheal lesion, with tracheal lumen invasion.

The patient underwent fiberoptic bronchoscopy that revealed a hypervascularized neof ormative lesion of the posterior wall of the trachea that reduced tracheal diameter by 50% (Fig. 1). Biopsy histological analysis showed tracheal mucosal invasion by small lymphocytes with slightly irregular nucleus and the presence of lymphoepithelial lesions. The immunohistochemical study revealed staining for CD20 and bcl-2 and absence of staining for CD3, CD5, CD10 and cyclin-D1, compatible with involvement of the tracheal mucosa by low grade MALT lymphoma.

Ventilation/perfusion scintigraphy was also performed, showing intermediate probability of PTE.