



## Intracavitary nodule in active tuberculosis: differential diagnosis of aspergilloma

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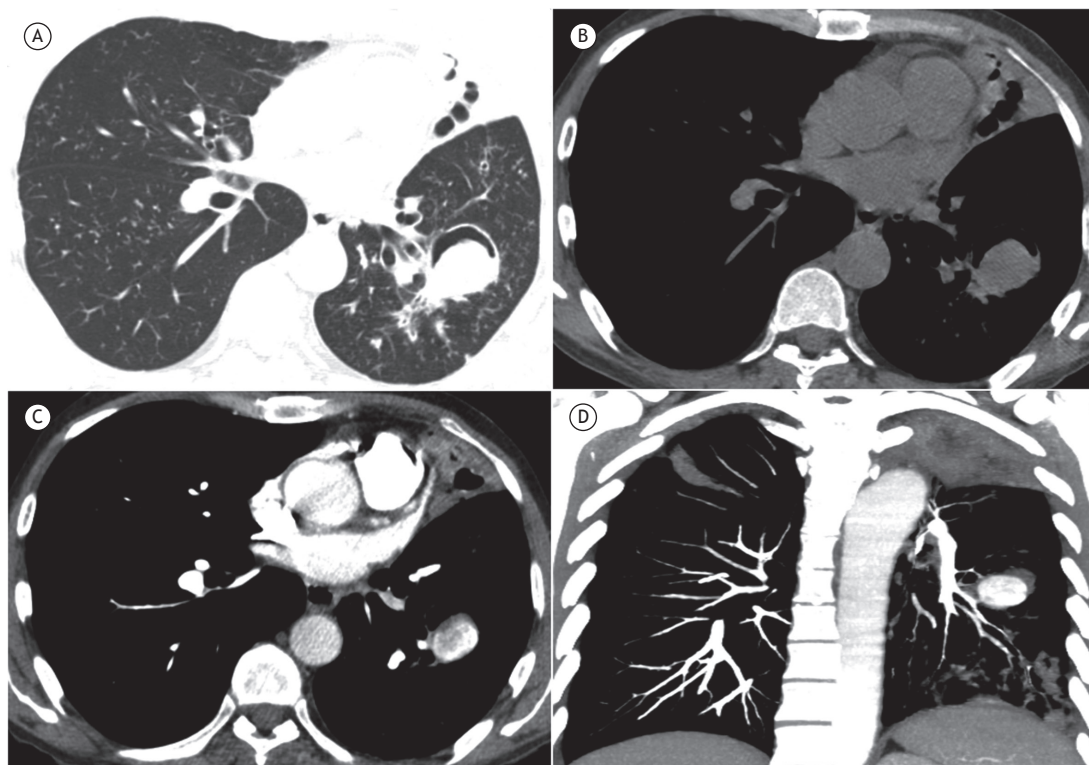
### TO THE EDITOR:

A 40-year-old male presented to the emergency room with a three-month history of cough, fever, and weight loss. Twenty-four hours later, he also presented sudden hemoptysis. A chest X-ray revealed bilateral non-homogeneous opacities, predominantly in the left lung. Chest CT showed small nodules scattered throughout both lungs, with cavities in the left lung. We also noted a nodule inside a cavity, with air interposed between the nodule and the cavity wall—the air crescent sign (ACS)—suggesting an intracavitary fungus ball. The nodule showed intense enhancement after contrast administration, suggesting a diagnosis of Rasmussen aneurysm (RA; Figure 1). Fiberoptic bronchoscopy showed active bleeding from the lower left lobar bronchus. Sputum and BAL fluid were positive for AFB, subsequently identified as *Mycobacterium*

*tuberculosis*. Treatment with antituberculosis drugs was started, and vascular occlusion with coil embolization was performed successfully. The patient was discharged from the hospital one month later.

Hemoptysis in the presence of tuberculosis is frequently due to erosion of the bronchial artery or of a branch of the pulmonary artery; it can result from numerous conditions, such as bronchiectasis, aspergilloma, tuberculosis reactivation, scar carcinoma, chronic bronchitis, broncholithiasis, microbial colonization within a cavity, and RA.<sup>(1,2)</sup> Contrast-enhanced CT of the chest and bronchoscopy remain the methods of choice for the evaluation of pulmonary hemorrhage.

The ACS is defined as a crescent-shaped collection of air that separates the wall of a cavity from an inner mass.<sup>(3)</sup> Although *Aspergillus* spp. are the most



**Figure 1.** In A, an axial CT scan with a lung-window setting at the level of the lower lobes, showing small nodules in both lungs, a consolidation with cavitation in the lingula, and a nodule inside a cavity, with air interposed between the nodule and the cavity wall (the air crescent sign). In B, an axial CT scan with a mediastinal-window setting, demonstrating that the nodule is homogeneous. In C and D, axial and coronal reconstructions, respectively, of contrast-enhanced CT scans, showing intense enhancement of the intracavitary nodule.

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common cause of the ACS, through the colonization of pre-existing cavities or retraction of infarcted lung in angioinvasive aspergillosis, this finding has been reported in association with a variety of other conditions, including tuberculosis (blood clot or RA), hydatid cysts, cavitory lung cancer, bacterial lung abscess with inspissated pus, other fungal or fungal-like conditions (coccidioidomycosis, actinomycosis, nocardiosis, and candidiasis), and intracavitary hematoma.<sup>(3-5)</sup>

Most intracavitary nodules associated with tuberculosis correspond to aspergillomas (fungus balls caused by *Aspergillus* spp. colonization).<sup>(6)</sup> Less common etiologies include blood clots, cavitory lung cancer, and RA. Aspergilloma results from the fungal colonization of a preexisting pulmonary cavitation, generally secondary to tuberculosis or sarcoidosis. Although often indolent, with few or no symptoms, the process frequently involves hemoptysis, which can be fatal.

A change in the position of the intracavitary nodule when the patient changes position is a valuable radiological sign for the diagnosis of aspergilloma. Therefore, the classic CT evaluation of aspergilloma includes supine and prone scans in order to demonstrate whether the

central mass is free or attached to the cavity wall. In contrast to a fungus ball, cavitory lung cancer and RA are fixed to the cavity wall. Contrast enhancement on CT images of the mass might also help differentiate between aspergilloma and malignancy or RA.<sup>(7)</sup>

Pulmonary artery pseudoaneurysms secondary to pulmonary tuberculosis are classified as RAs. Progressive weakening of the arterial wall occurs as granulation tissue replaces the adventitia and media of the artery. The granulation tissue in the vessel wall is then gradually replaced by fibrin, resulting in the thinning of the arterial wall, pseudoaneurysm formation, and subsequent rupture with hemorrhage.<sup>(8,9)</sup> Hemoptysis is the usual symptom at initial manifestation, and can be life threatening when massive.<sup>(8)</sup> On contrast-enhanced CT scans, RA can be identified as a markedly enhanced nodule within the wall of a tuberculous cavity.<sup>(10)</sup> The first-line treatment for RA is endovascular embolization.<sup>(8-10)</sup>

In conclusion, RA should be included in the differential diagnosis of hemoptysis in patients with tuberculosis presenting the ACS. Contrast-enhanced CT plays an important role in the evaluation of such patients.

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