Differing Chest Imaging Patterns in Three Patients Are Caused by One Microbe*

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Chest imaging studies from three different patients are shown in the accompanying figures. Which of the following is the most likely cause of the findings?

A. Pseudomonas pseudomallei
B. Mycobacterium tuberculosis
C. Zygomycetes nuco
D. Coccidioides immitis
E. Aspergillus fumigatus

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Answer: E. *A. fumigatus*

To date, the only organisms that have been reported to cause all the diseases manifested by the three different chest imaging studies are species of the genus Aspergillus. The V-shaped density in Figure 1 pathologically correlates with a mucoid impaction. The nodule with an air-crescent sign in Figure 2 correlates with hemorrhagic infarction that is resolving. The biapical densities with thick-walled cavities, one of which contains a mass, in Figure 3 correlates with a chronic, inflammatory, necrotizing infection with a coincidental aspergilloma. The mucoid impaction can be a manifestation of allergic bronchopulmonary aspergillosis, the air-crescent sign can be a manifestation of acute invasive pulmonary aspergillosis, and the cavitary pattern can be a manifestation of chronic necrotizing pulmonary aspergillosis.

Aspergillus species appear to be unique in the wide spectrum of pulmonary disease they can cause. The spectrum includes: (1) a variety of allergic reactions in hypersensitized hosts (*eg*, allergic bronchopulmonary aspergillosis); (2) saprophytic colonization of preexisting cavities (*eg*, aspergilloma); (3) noninvasive or superficially invasive necrotizing tracheobronchitis in mildly compromised patients; (4) chronic progressive and destructive pulmonary disease (*eg*, chronic necrotizing pulmonary aspergillosis); and (5) rapidly progressive, invasive infection in severely immunosuppressed patients (*eg*, acute invasive pulmonary aspergillosis), particularly those with acute leukemia. These protean manifestations of aspergillus pulmonary disease can overlap clinically, radiographically, and histopathologically. For example, Figure 3 was taken from a patient who not only had chronic necrotizing pulmonary aspergillosis with an aspergilloma but also allergic bronchopulmonary aspergillosis.

While the other organisms may cause disease with chest imaging patterns similar to those in Figures 2 and 3, they have not been associated with mucoid impactions (*ie*, laminated plugs of inspissated mucus in segmental or subsegmental airways). Radiographic manifestations of mucoid impactions not only include V-shaped densities, but also Y-shaped and “cluster of grapes”-shaped densities, solitary pulmonary nodules, or atelectasis to include collapse of an entire lung. While they are typically seen in patients with allergic bronchopulmonary aspergillosis, mucoid impactions can also occur in chronic asthma, chronic bronchitis, cystic fibrosis, and behind central obstructions such as those due to bronchial carcinoids and bronchial atresia.

**Suggested Readings**


