

A woman with chronic asthma, lung infiltrates, and bronchiectasis

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This woman was first seen in the medical center clinic at 24 years of age with wheezing, a productive cough, dyspnea, low-grade fever, digital clubbing, cyanosis of skin and mucous membranes, and chest pain. She was diagnosed with asthma when she was 3 years old but had had no severe attacks since she was 17.

The radiographs shown here were taken during emergency visits for respiratory distress and cover a period of about 8 and a half years. They illustrate the progression of her disease—allergic bronchopulmonary aspergillosis. The diagnosis was based on the patient's history of asthma, antigen skin test reactions, serologic findings of aspergillus antibodies, and plain chest radiographs documenting varying degrees of respiratory involvement.

Radiographic findings included mucoid plugs at different sites in the lungs with cystic bronchiectasis (Figures 1 and 2, page 00), changing patterns of densities and obstructions (Figure 3, page 00), and a period of improvement (Figure 4, page 00) achieved by pulmonary toilet and 10% acetylcysteine (Mucomyst). Evidence of residual bronchiectasis remained over the left hilum, especially in the right upper lobe, with fibrotic changes causing retraction of the hilum into an abnormally high position. She was lost to follow-up when she moved to Arizona for a climate change but died of respiratory complications 2 months later.

Discussion

Allergic bronchopulmonary aspergillosis, a severe complication of asthma (and cystic fibrosis), is a hypersensitivity reaction to aspergillus (usually *Aspergillus fumigatus*) that causes inflammation of the airways

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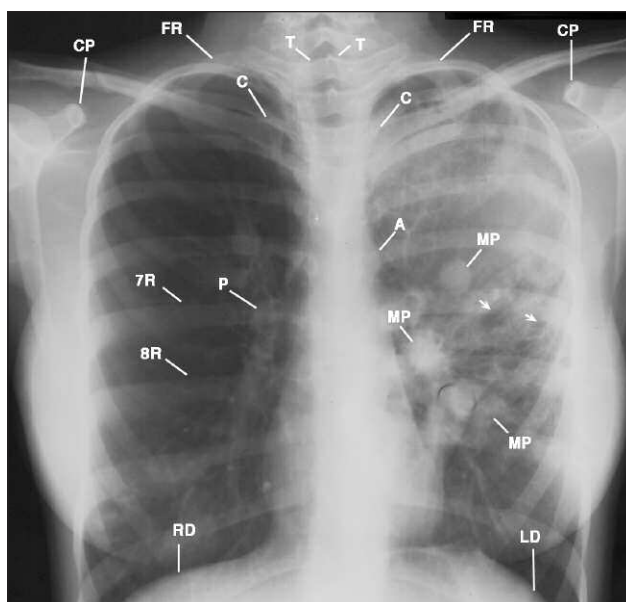


Figure 1 This posteroanterior (PA) chest radiograph displays the hyperlucent expanded right lung depressing the right hemidiaphragm (RD) and multiple dense mucoïd impactions or plugs (MP) in the atelectatic left lung. Observe the cystic bronchiectasis in the left lung (arrows), hazy left upper lung and left breast, dense lower left lung secondary to the atelectasis, and asymmetrical right 7th intercostal space (between the 7th and 8th posterior ribs [7R and 8R]) compared with the left. A = aorta; C = clavicle; CP = coracoid process; FR = first rib; LD = left hemidiaphragm; P = pulmonary artery; RD = right hemidiaphragm.

and air sacs of the lungs. The fungus is ubiquitous in soil and grows on dead leaves, stored grain, bird droppings, compost heaps, and other decaying vegetation; it can cause severe illness in those with compromised immune systems and chronic lung disease.

The condition was first reported in this country in 1968,¹ and diagnostic criteria were established in 1977-1978.^{2,3} They include asthma; serum eosinophilia (more than 1,000/ μ L); pulmonary infiltrates; central bronchiectasis; immediate skin-prick reaction to

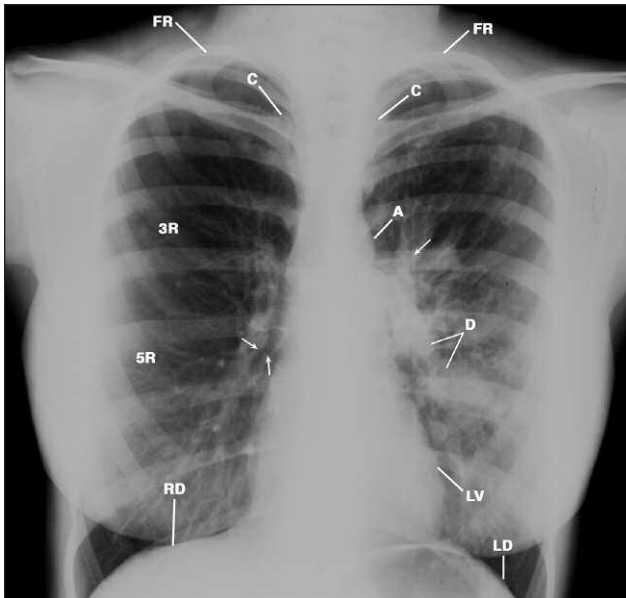


Figure 2 This posteroanterior (PA) radiograph displays residual dense mucoid impactions (D) obscuring the left hilum. Density in the lower left region with partial atelectasis of the lung fields might be mistaken for Löffler's syndrome, but it usually lasts less than 3 weeks, with minimal cough. Observe the cystic bronchiectasis in the left upper lung (single arrow), thickening of the right lower bronchus (2 arrows), the left ventricle marginating the lucency of the "wet" left lung, and the acute sloping ribs suggesting a narrowed thorax. A = aorta; C = clavicle; FR = first rib; LD = left hemidiaphragm; RD = right hemidiaphragm.

aspergillus antigen; precipitating antibodies against the antigen; elevated immunoglobulin (Ig) E concentration; and elevated IgE and IgG antibodies to aspergillus. Several stages of the disease have also been recognized: acute, remission, recurrent exacerbation, corticosteroid-dependent asthma, and fibrosis.⁴

Symptoms include wheezing, a cough producing brownish plugs of sputum, and fever, as in our patient. Evaluation includes a complete blood cell count, aspergillus antigen skin testing, serologic testing for IgE concentration and antibodies to aspergillus, and chest radiographs and computed tomography (CT) to detect bronchiectasis. Some experts have proposed asthma, immediate skin-prick reaction to aspergillus antigen, and central bronchiectasis by CT scan as minimal essential criteria for the diagnosis, noting that early diagnosis may be more likely to prevent lung damage.⁵

Treatment is directed toward avoiding known allergens and respiratory irritants and controlling

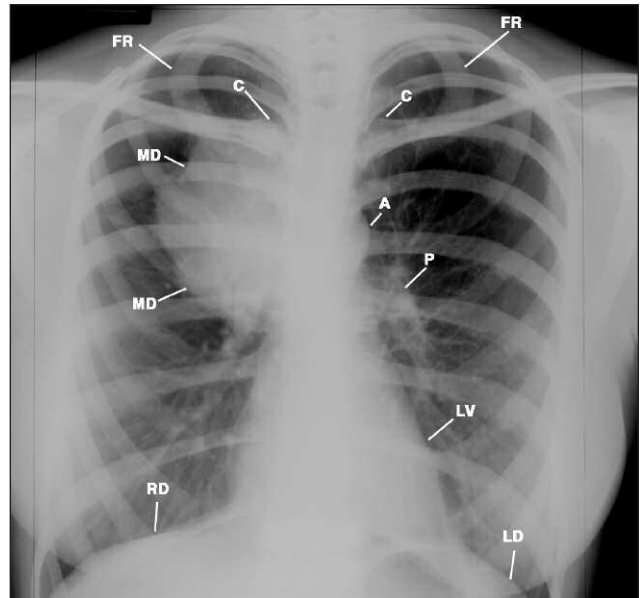


Figure 3 This posteroanterior (PA) radiograph displays a large mucoid density (MD) that obstructs the bronchi of the entire anterior segment of the right upper lobe. The secondary consolidation mimics bronchogenic carcinoma in both appearance and location, and without the other images in this series, a mediastinal mass would be considered in the diagnosis. A = aorta; C = clavicle; FR = first rib; LV = left ventricle; LD = left hemidiaphragm; P = pulmonary artery; RD = right hemidiaphragm.

symptoms and airway inflammation through medication. Most patients use long-term corticosteroid and β_2 -agonist therapy in accordance with national asthma treatment guidelines, with tapering of the corticosteroid dose if possible. Itraconazole (Sporanox) is recommended as adjunctive therapy.^{6,7}

Mucous plugs may remain for months, eventually being expectorated and leaving bronchiectatic segments representing thickened walls of the dilated bronchi. The changing pattern of densities occurs as old plugs are coughed up and then replaced by new ones in different locations, which can be appreciated by comparing the serial radiographs in our series.

Take-home message

Allergic bronchopulmonary aspergillosis is a severe hypersensitivity lung disease almost always caused by *Aspergillus fumigatus*. Major diagnostic criteria for this potentially life-threatening condition are asthma, an immediate reaction to aspergillus antigen skin testing, and central bronchiectasis. If avail-

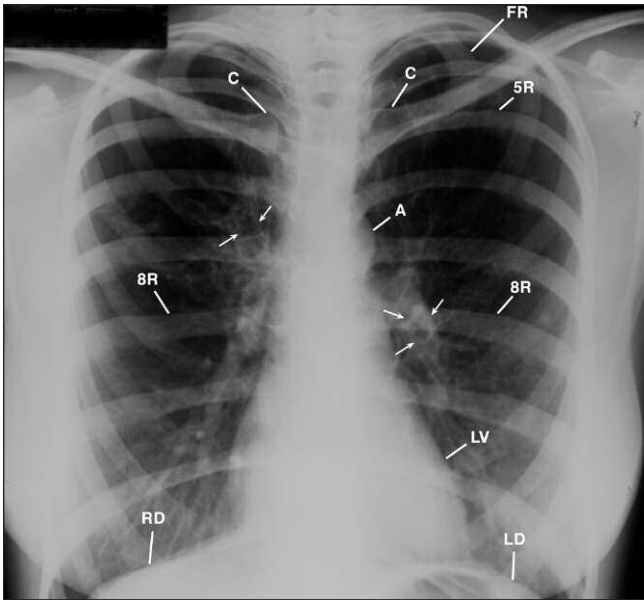


Figure 4 This posteroanterior (PA) radiograph indicates improvement from pulmonary toilet and treatment with mucolytic aerosols. Evidence of residual bronchiectasis remains, especially in the right upper lobe (2 arrows) where fibrotic changes caused the hilum to retract into an abnormally high position. The thickened cystic bronchiectasis over the left hilum (3 arrows) results from expectorated mucous plugs in **Figure 2** (page 00). A = aorta; C = clavicle; FR = first rib; LD = left hemidiaphragm; LV = left ventricle; RD = right hemidiaphragm; 5R = 5th rib; 8R = 8th rib.

able, serial radiographs are helpful in demarcating varying locations of mucous plugs. As they are expectorated, others often appear in different locations. Guidelines for the diagnosis and management of allergic bronchial asthma should be strictly followed. **FPR**

REFERENCES

1. Patterson R, Golbert TM. Hypersensitivity disease of the lung. *Univ Mich Med Cent J* 1968;34:8-11.
2. Rosenberg M, Patterson R, Mintzer R, et al. Clinical and immunologic criteria for the diagnosis of allergic bronchopulmonary aspergillosis. *Ann Intern Med* 1977;86:405-414.
3. Ricketti AJ, Greenberger PA, Mintzer RA, et al. Allergic bronchopulmonary aspergillosis. *Chest* 1984;86:773-778.
4. Mendelson EB, Fisher MR, Mintzer RA, et al. Roentgenographic and clinical staging of allergic bronchopulmonary aspergillosis. *Chest* 1985;87:334-339.
5. Eaton T, Garrett J, Milne D, et al. Allergic bronchopulmonary aspergillosis in the asthma clinic. A prospective evaluation of CT in the diagnostic algorithm. *Chest* 2000;118:66-72.
6. Stevens DA, Kan VL, Judson MA, et al. Practice guidelines for diseases caused by *Aspergillus*. *Clin Infect Dis* 2000;30:696-709.
7. Stevens DA, Schwartz HJ, Lee JY, et al. A randomized trial of Itraconazole in allergic bronchopulmonary aspergillosis. *N Engl J Med* 2000;342:756-762.