We describe a 32-year-old man with no history of pulmonary disease who presented with extensive cavernous destruction of the right upper lobe as an incidental finding on a chest x-ray film. All major criteria of allergic bronchopulmonary aspergillosis (ABPA) were present. Histologic examination of the resected lobe showed the typical features of ABPA. The differential diagnosis of multiple cavitating lesions should include ABPA.

(Chest 1994; 105:1871-72)

ABPA = allergic bronchopulmonary aspergillosis; KU = Karmen unit

Allergic bronchopulmonary aspergillosis (ABPA) is a disease characterized by the following major criteria: (1) bronchial asthma, (2) blood eosinophilia (>1,000/μl), (3) immediate cutaneous reactivity to Aspergillus fumigatus antigen, (4) precipitating antibodies against A. fumigatus antigen, (5) elevated serum immunoglobulin (Ig)E concentration, (6) a history of transient or fixed pulmonary infiltrates, (7) central bronchiectasis, and (8) elevated serum IgE and IgG antibodies to A. fumigatus. The typical roentgenographic changes in ABPA consist of transient perihilar infiltrates resulting from mucoid impactions or parenchymal infiltrates ("toothpaste:" gloved-finger, or V-shaped infiltrates) in the early stages (1 to 3, ie, acute, remission, and exacerbation) and permanent findings including proximal bronchiectasis, parallel lines ("tramline"), or ring shadows, and signs of pulmonary fibrosis, often with honeycombing in the advanced stages (4 and 5, ie, corticosteroid-dependent asthma and fibrosis).

CASE REPORT

A 32-year-old, athletic, nonsmoking white man from California with no history of either previous operations or diseases other than recurrent rhinitis and bronchitis as a teenager, had a chest roentgenogram taken because of shoulder pain after a mountain bike accident. Unexpectedly, the right upper lobe was noted to be cavernously destroyed (Fig 1). The patient was thus referred to our hospital with the suspicion of tuberculosis. He was asymptomatic and complained only about a mild intermittent cough accompanied sometimes by a brownish mucoid discharge and an occasional wheezing during strenuous exercise with his mountain bike. The physical examination was normal except for decreased breath sounds in the right upper field. The erythrocyte sedimentation rate (ESR) was 25 mm/h. Hematocrit value was 40 percent and WBC count was 8,900/mm³ with eosinophils.

*From the Departments of Internal Medicine (Drs. Sauter, Speich, Russi, and Follath), Surgery (Dr. Weder), and Pathology (Dr. Vogt). University Hospital of Zurich, Zurich, Switzerland.

Reprint requests: Dr. Speich, Internal Medicine, University Hospital, CH 8092 Zurich, Switzerland

Figure 1. Top, Chest roentgenogram showing multiple cavitating lesions in the right upper lobe. Bottom, Chest computed tomography revealed fluid filled cavitations, solid changes, and central bronchiectasis.

1,120/mm³. The C-reactive protein was 1.7 mg/dl and serum chemistry values were normal. A tuberculin skin test was nonreactive. The sputum contained brownish plugs consisting of eosinophils, Charcot-Leyden crystals, and hyphae of Aspergillus that were cultivated as A. fumigatus. The pulmonary function tests revealed a moderately severe, partially reversible bronchial obstruction: vital capacity (VC), 5.140 ml (93 percent pred); FEV₁, 2.030 ml (47 percent, FEV₁/VC:39 percent), improving to 3.080 ml (71 percent pred, FEV₁/VC:57 percent) after inhalation of salbutamol. An allergy panel elicited a distinct immediate skin reaction to A. fumigatus. The total IgE was elevated strikingly to 9,700 Karmen units (KU)/ml (normal, <200 KU/ml). Precipitins to A. fumigatus were strongly positive by immunodiffusion. In the unconcentrated serum, six bands were detectable by using six different antigens, whereas no bands with antigens of Aspergillus niger, Aspergillus nidulans, Aspergillus flavus, Aspergillus terreus, and Pseudallescheria boydii were present. The specific IgE-radioallergosorbent test to A. fumigatus was positive as well (class 4: 43.4 KU/L). Computed tomography showed a complete cavernous destruction of the right upper lobe with multiple fluid levels and central bronchiectasis (Fig 1). Bronchoscopy revealed edematous swelling of the ostium to the right up-
Cavernous Destruction of Upper Lung Lobe (Sauter et al)

per lobe and drainage of pus. Bronchoalveolar lavage showed an increased total cell number of 2,030/mm³ with 29 percent eosinophils and 64 percent neutrophils. There were 6 percent macrophages and 1 percent lymphocytes. In the bronchoalveolar lavage fluid A fumigatus could be cultured, and no other organisms were present. All these findings suggest the diagnosis of ABPA. After a treatment consisting of 40 mg prednisone daily and the inhalation of a beta-adrenergic agent, the lung functionally within 1 week; VC, 600 ml (110 percent pred); FEV₁, 4,210 ml (96 percent pred); and TLC, 7,010 ml (96 percent). The right upper lobe was completely destroyed, so a lobectomy was performed 2 weeks after admission. Macroscopically, the lung parenchyma was replaced by necrotic tissue and multiple cavities filled with a viscous brownish-yellowish mucus and necrotic debris (Fig 2). Microscopic examination showed all the characteristics of an ABPA, i.e., bronchiectasis, bronchocentric granulomatosis with tissue eosinophils and giant cells, organizing pneumonia, mucoid impaction of the bronchi with typical lamellar arrangement of the plugs containing Charcot-Leyden crystals, and noninvasive fungal hyphae of A fumigatus in the necrotic debris of the bronchial lumina and the caverns (Fig 2). The lung parenchyma was completely destroyed. Single small obliterated vessels with circumscribed parenchymal necrosis could be seen. Cultures of the mucus showed growth of low concentrations of Mycobacterium terrae that was considered to be a colonizing organism (absence of acid-fast bacilli in the resected specimen and typical caseating granulomatous changes histologically).

The patient completely recovered after the operation, and he was treated with inhaled steroids. The total IgE decreased to 1,890 KU/ml within 4 weeks, and the eosinophils in the peripheral blood were normal. The lung function subsequently remained normal except for a mild completely reversible obstructive defect.

**DISCUSSION**

To our knowledge, this is the first description of ABPA with complete cavernous destruction of a lung lobe. Central ring shadows, sometimes filled with fluid, are not unusual in ABPA. Single cavitations may be seen in up to 14 percent of the cases but these changes usually disappear within some days or weeks after treatment with corticosteroids. A case of pneumothorax due to a large bulla of the upper lobe in a patient with advanced (stage 5) ABPA has been described. Well-known textbooks do not mention ABPA as a possible cause of multiple cavitating lesions.

It remains unknown, however, whether these cavities are caused by destruction of lung tissue or by bronchietatic changes. Our case shows that an extensive cavitating destruction of pulmonary parenchyma mimicking tuberculosis or fungal infections may well be a feature of ABPA. No previous chest x-ray films of this minimally symptomatic patient exist, so we can only speculate about the pathogenesis of these cavitations. We believe that they may be caused by persistent mucous plugging of the right upper lobe bronchus with atelectasis and destruction of the peripheral lung tissue. Thrombotic occlusion of small vessels with secondary infarction of pulmonary tissue may be another important pathogenetic factor. To our knowledge, these latter findings have not yet been described pathologically.

In conclusion, the differential diagnosis of multiple cavitating pulmonary infiltrates should include ABPA that must be sought actively by serologic, functional, and computed tomography examinations even in an oligosymptomatic patient.

**REFERENCES**