sure gradient to be exceeded as intrathoracic pressures as high as 150 mm Hg are produced. The apparent innocuous coughing, as occurred in this patient, thus represents a very real determinant of the occurrence of pneumothorax.

Finally, consideration must be given to the increase in surface tension resulting from the removal of surfactant from lavaged alveoli. It is suggested that the combination of increased hydrostatic and surface forces exerted on an already structurally compromised parenchyma secondary to pneumonia predisposes to the dissection of air and pneumothorax development, an entity that may be termed infectious interstitial emphysema.

These adverse consequences of BAL, including fluid retention, obliteration of collateral communications, and increased forces, dictate the careful monitoring of patients who undergo FOB and BAL, with an expiratory chest x-ray film should there be signs or symptoms of pneumothorax.

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Fatal Hemoptysis Due to Lung Abscess and Pulmoaortic Fistula*

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A 79-year-old man was hospitalized because of staphylococcal sepsis, and subsequently died from massive hemoptysis. Autopsy revealed a lung abscess which had eroded into the aorta. Severe atherosclerosis of the aorta may have been an important contributing factor.

Massive hemoptysis is a well known complication of lung abscess. Pathologic studies support that this is usually due to erosion of the infection into a pulmonary artery. We wish to present an unusual case of massive hemoptysis complicating lung abscess in which the infection eroded into the thoracic aorta. We have been unable to find a similar case in the literature. In addition to a case presentation, the roentgenographic and pathologic features will be discussed.

CASE REPORT

The patient was a 79-year-old man who was admitted to the hospital because of general weakness, malaise, and mild diarrhea of one week's duration. He was an insulin-dependent diabetic with a past history of alcohol abuse resulting in pancreatitis and pseudocyst formation, which required surgery six years prior to admission. There was no history of tuberculosis. He was a nonsmoker. Recent alcohol use was denied.

The admission physical examination revealed a cachectic elderly man with a temperature of 37.3°C. Lung, heart, and abdominal examination results were normal. The white blood cell count was 14.5 with 75 neutrophils and four band cells. The hematocrit value was 37.2 percent. Results from clotting studies and other chemistries, including amylase and lipase, were normal. The chest x-ray film (Fig 1) revealed extensive aortic arch calcification and a double density left of the trachea, interpreted as an ectatic arch. The urinalysis showed pyuria.

He was admitted with presumed urinary tract infection and possibly sepsis. After appropriate cultures were taken, ampicillin and gentamicin were begun. Staphylococcus aureus, however, grew from two blood cultures and the urine. His antibiotic therapy was changed to oxacillin.

On the second hospital day, hematemesis developed. Endoscopy showed no bleeding site. The following day, he was found in respiratory distress and intubation was required. A chest x-ray film (Fig 2) showed a new parenchymal density in the left apex.

On the fourth hospital day, hemoptysis occurred after repositioning the endotracheal tube. Bronchoscopy showed moderate tracheitis and blood in both mainstem bronchi. A large blood clot was removed from the right side. A bleeding site could not be identified. Culture of the bronchial washings grew normal flora. An AFB smear was negative and cytologic findings were benign. Computed chest tomography (Fig 3) demonstrated a mass in the upper part of the left chest. The radiologist thought it was extrapleural and lay between the great vessels and the left lung. The adjacent left upper lobe had areas of consolidation. Bilateral effusions were present. The aorta was heavily calcified, but no aneurysm was seen. Images obtained after contrast did not reveal an intimal flap. A chest surgeon was consulted and felt the patient was not a surgical candidate regardless of diagnosis. No further diagnostic studies were done. The patient was supported with blood products and antibiotics, but massive hemoptysis occurred and the patient died.

At autopsy, the left lung weighed 1,100 grams. A 6 x 6 cm abscess

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was present in the medial aspect of the left upper lobe and was adherent to the descending thoracic aorta. Numerous Gram-positive cocci were seen microscopically and Staphylococcus aureus grew from postmortem cultures from the abscess. A small communication was noted between the abscess and the aorta. There was no evidence for mycotic aneurysm of the aorta or other great vessels.

**DISCUSSION**

Several aspects of the case presentation bear comment. The cause of the hemoptysis remained obscure until autopsy. Plain roentgenograms of the chest never showed the typical features of lung abscess. Computed tomography certainly added information, but could not define the nature of the lesion or even localize the lesion as being in the lung. Air space disease was present but was suspected to be aspirated blood. Bronchoscopy added little and was difficult as is often the case when hemoptysis is massive. Sputum cultures, even those obtained at the time of bronchoscopy, never grew staphylococcal organisms. Arteriography would have been the next diagnostic procedure, but also would have been nondiagnostic. Hemoptysis may occur in up to 40 percent of patients with lung abscess, but massive hemoptysis complicates fewer than 10 percent of these cases. Where pathologic material is available, involvement of the pulmonary artery is the most common site of bleeding.

Mortality from massive hemoptysis of any cause is high and this appears to be true when the cause is lung abscess as well. Surgery must always be considered. In a series by Crocco et al., four patients treated without surgery died, whereas the two who went to surgery survived. In the series by Thoms et al., the one patient who did not have surgery died, whereas the seven who went to surgery survived.

The finding of a lung abscess at autopsy was a surprise. The premortem diagnosis was mycotic aneurysm, which has been reported as a cause of fatal hemoptysis. Massive hemoptysis due to pulmooartict fistula has previously been reported in the setting of trauma and an aortic patch graft. We suspect that the marked atherosclerosis present in this case was a predisposing factor.

**REFERENCES**