BRIEF OBSERVATION

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Solitary Lung Masses Due to Occult Aspiration

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ABSTRACT

BACKGROUND: Aspiration occurs commonly, at times clinically occult, and is recognized to cause a widening spectrum of lung disorders. Presentation of aspiration as a lung mass has not been described.

METHODS: Among cases of aspiration-related pulmonary diseases diagnosed at Mayo Clinic (Rochester, Minn) from 2007 to 2013, 3 patients were identified to have presented with a solitary lung mass lesion.

RESULTS: The age of 3 patients, all men with a history of gastroesophageal reflux disease, ranged from 53 to 65 years. All patients presented with dyspnea, cough, and intermittent fevers. Chest computed tomography in each patient demonstrated malignant-appearing solitary lung mass, cavitated in 2 patients. Two patients underwent positron emission tomography, which showed intense fluorodeoxyglucose uptake in the lung mass for both. Surgical lung resection revealed acute and organizing pneumonia with giant cell reaction to foreign material, consistent with aspiration in all 3 patients. None of these lung masses were located in the "dependent" (posterior or basal) lung zones. These patients were managed with antireflux medical therapy; 1 patient underwent a Nissen fundoplication procedure for recurrent symptoms. No additional aspiration-related complications occurred during the follow-up period ranging from 24 to 84 months.

CONCLUSIONS: Aspiration-related pulmonary complications can present as a solitary lung mass that may not be located in dependent lung zones, which have traditionally been associated with aspiration-related pulmonary diseases.

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KEYWORDS: Aspiration pneumonia; Respiratory aspiration; Lung neoplasms

Aspiration, defined as the entrance of foreign matter into the airways and lung, is a common phenomenon in the general population and causes a broad spectrum of pulmonary diseases with varied radiologic manifestations. Aspiration can occur silently with the subject unaware of the event, particularly during sleep.[1] The syndrome resulting from aspiration is determined by the amount and nature of the aspirated matter and chronicity of the process, as well as host factors.[2,3] Airway obstruction by foreign body, aspiration pneumonia, and aspiration pneumonitis are well-recognized aspiration-related pulmonary syndromes, whereas other entities, including exogenous lipoid pneumonia, diffuse aspiration bronchiolitis, and interstitial lung disease, are less commonly encountered.[2-4] Clinical and radiologic findings tend to be nonspecific, which makes it difficult to identify aspiration as the cause in the absence of identifiable aspiration events. We recently encountered a patient presenting with a malignant-appearing lung mass that proved to be caused by aspiration of food matter. Computer-assisted search of medical records at Mayo Clinic (Rochester, Minn) yielded 2 additional cases encountered during the period 2007-2013.

CLINICAL SUMMARY

A 65-year-old man, an ex-smoker with a 60 pack-year history, presented with a 1-month history of dyspnea, cough, and fevers. Although his sputum production and fever resolved with empiric antimicrobial therapy, subsequent chest computed tomography (CT) revealed a 4-cm thick-walled cavitary lesion in the right upper lobe (**Figure 1**). His medical history included asthma and gastroesophageal reflux disease, which was symptomatically controlled with daily esomeprazole

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therapy but had been complicated by esophageal strictures that had been dilated several times previously. Both physical examination and screening blood tests yielded normal results. Bronchoscopic examination revealed no endobronchial lesions, and bronchoscopic biopsy yielded only benign alveolar parenchyma. Positron emission tomography (PET) of the chest revealed intense [^{18}F]fluorodeoxyglucose (FDG) uptake in the cavitary mass. Surgical lobar resection showed acute and organizing pneumonia with a giant-cell reaction to foreign material, consistent with aspiration (**Figure 2**). The patient recalled no episodes of aspiration. He was instructed regarding antireflux lifestyle measures, and esomeprazole therapy was continued. No additional aspiration-related issues were observed during the 7-year follow-up period.

CLINICAL SIGNIFICANCE

- Aspiration can sometimes present as a lung mass mimicking a lung cancer, including FDG uptake on PET scanning.
- Aspiration-related lung lesions may not necessarily be located in "dependent" lung zones, traditionally associated with aspiration pneumonia.

A 53-year-old man, a never-smoker, presented with dyspnea, low-grade fevers, and cough productive of sputum, sometimes streaked with blood, of 3-month duration. His past medical history was noted for gastroesophageal reflux disease treated with daily omeprazole therapy. Physical examination and screening laboratory tests yielded normal results. His symptoms partially improved with levofloxacin therapy, but a chest CT scan showed a 3.5-cm spiculated and cavitated mass with surrounding ground-glass attenuation laterally in the superior segment of the left lower lobe. Bronchoscopy was nondiagnostic with no endobronchial lesions, and bronchoscopic biopsy yielded nondiagnostic alveolar parenchyma. Left lower lobectomy was performed for suspected lung cancer but yielded histopathologic features of aspiration pneumonia, with foreign material identified within terminal bronchioles. Despite antireflux lifestyle measures and high-dose omeprazole therapy, he continued to experience recurrent heartburn and eventually underwent a Nissen fundoplication surgery. He was doing well over the 39-month follow-up period.

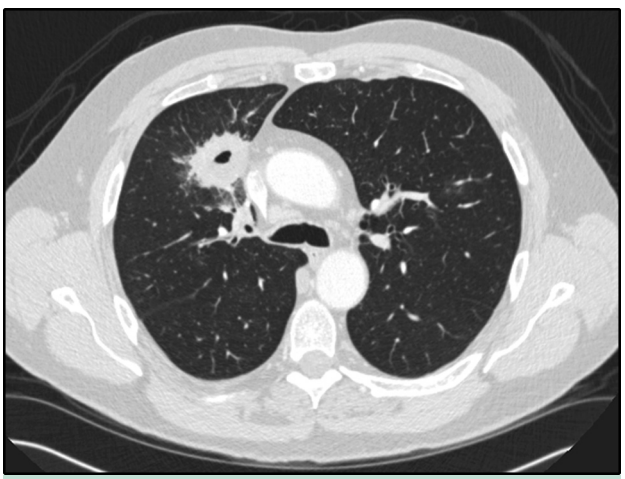

Figure 1 Chest computed tomography scan demonstrating a 4-cm cavitated lung mass in the right upper lobe abutting the mediastinum.

A 57-year-old man, an ex-smoker with a 30 pack-year history, presented with episodes of cough and fevers over the preceding 1.5 years. His past medical history was notable for gastroesophageal reflux disease complicated by Barrett's esophagus, for which he was taking omeprazole therapy. Physical examination and screening blood tests yielded normal results. A chest CT scan demonstrated a 4-cm peripheral spiculated mass in the right upper lobe posterolaterally (**Figure 3**) with intense FDG uptake on PET scan (**Figure 4**). Bronchoscopic examination showed no endobronchial lesions, and no biopsy was obtained. Right upper lobectomy was performed for suspected lung cancer but showed acute and organizing aspiration pneumonia with focal abscess formation. He was instructed regarding antireflux measures and continued omeprazole therapy. No additional events have occurred in the 2-year follow-up period.

DISCUSSION

Three cases described in the present report demonstrate another form of pulmonary disease caused by aspiration and broaden the spectrum of aspiration-related lung diseases. All 3 patients were suspected to have lung cancer on the basis of their persistent respiratory symptoms and worrisome solitary lung mass seen on chest imaging. Furthermore, PET scan showed the lesions to be hypermetabolic and heightened the suspicion for lung cancer. Although PET scanning is useful in the evaluation of solitary lung nodules and lung cancer staging, it is recognized that false-positive results can be encountered, with FDG uptake occurring in metabolically active infectious or inflammatory lesions, as seen in our patients.[5,6] Surgical lung resection showed aspiration to be the cause of the mass lesion in all 3 cases. None of the patients had a clinical history of aspiration or choking, and no foreign matters were seen by bronchoscopy.

Conditions known to predispose patients to aspiration include depressed consciousness, dysphagia, compromised airway defense, and gastrointestinal disorders.[7,8] The predominant risk factor in our patients was gastroesophageal reflux disease. Indeed, gastroesophageal reflux disease has been noted to be a common risk factor in subjects with occult aspiration. For example, Cardasis et al reported 25 patients with a spectrum of pulmonary diseases resulting from chronic occult aspiration.[9] All but 1 (96%) had gastroesophageal reflux disease. The prevalence of