Pulmonary Cryptococcosis with a Solitary Focal Ground-glass Opacity on High-resolution Computed Tomography


Abstract

We report a 74-year-old woman with cervical cancer who developed pulmonary cryptococcosis which presented as a solitary focal ground-glass opacity (GGO) on high-resolution computed tomography (HRCT). Serial HRCT showed the progression from the GGO to a discrete solid nodule. We hypothesize that the initial GGO may correspond pathologically to partial filling of air spaces with cryptococcal organisms and inflammatory cells. To our knowledge, this is the first report of pulmonary cryptococcosis with a solitary focal GGO on HRCT in the literature.


Key words: pulmonary cryptococcosis, Cryptococcus neoformans, natural history, video-assisted thoracic surgery, solitary focal ground-glass opacity, high-resolution computed tomography

Introduction

Pulmonary cryptococcosis is an uncommon disease caused by the inhalation of Cryptococcus neoformans. Although single or multiple nodules have been reported to be the most frequent finding of pulmonary cryptococcosis on chest radiography and computed tomography (CT) (1–4), the natural history of the nodular lesion is not well understood. Here, we report a case of pulmonary cryptococcosis which presented as a solitary focal ground-glass opacity (GGO) on high-resolution computed tomography (HRCT). We observed the progression from the GGO to a discrete solid nodule, which may improve our understanding of the natural history of pulmonary cryptococcosis.

Case Report

A 74-year-old woman with cervical cancer was referred to our department of respiratory disease, after a chest CT scan revealed a 10-mm GGO in the lateral segment of the right middle lobe (Fig. 1). A chest radiograph was normal. Head and abdominal CT scans and a bone scintigram did not reveal any additional abnormalities suggestive of metastases. The extent of the cancer was limited to the cervix of uterus and there was no sign of immunosuppression. The patient had no symptoms, physical examinations showed no significant findings, nor did laboratory data except for a slight elevation of C-reactive protein (0.7 mg/dl). Because of the small size of the lesion either a biopsy by video-assisted thoracic surgery (VATS) or an open lung biopsy was recommended. However, the patient decided to postpone it until after finishing radiotherapy for the cancer. We decided to follow up the GGO with HRCT, at intervals of one month. The radiotherapy was started immediately, and a total dose of 50 Gy was administered in 28 fractions.

One month later, an HRCT scan showed a slightly increased density of the GGO predominantly in the central area (Fig. 2). Three months later, HRCT revealed that the GGO had developed into a moderately-defined nodule (Fig. 3). At that time, a chest radiograph also revealed the nodule. We considered the possibility that this change reflected the rapid growth of a malignant tumor and therefore performed a VATS biopsy. The nodular lesion was surgically resected by wedge resection of the lateral segment of the right middle lobe. The biopsy revealed granuloma and Cryptococcus neoformans by periodic acid-Schiff (PAS) and Grocott’s methenamine silver stains, leading to a diagnosis of pulmonary cryptococcosis. Serum cryptococcal antigen examined...
on the day of the surgery was positive. However, the patient had no symptom of cryptococcal meningitis, and it was ruled out by cerebrospinal fluid test. Subsequently, the patient was treated with orally administered fluconazole at a daily dose of 200 mg for five months. The serum cryptococcal antigen became undetectable one month after the initiation of the treatment. For up to one year after the discontinuation of fluconazole no sign of recurrence has been seen.

Discussion

GGO is a nonspecific finding in the lung on CT, and has been defined as “hazy increased attenuation of lung, with preservation of bronchial and vascular margins caused by partial filling of air space, interstitial thickening, partial collapse of alveoli, normal expiration, or increased capillary blood volume (5).” To our knowledge, this is the first report of pulmonary cryptococcosis with a solitary focal GGO in the literature.

Figure 1. High-resolution CT (HRCT) upon presentation shows 10-mm ground-glass opacity (GGO) in the lateral segment of the right middle lobe.

Figure 2. HRCT after one month shows a slightly increased density of the GGO predominantly in the central area.

Figure 3. HRCT after three months shows that the GGO has developed into a moderately-defined nodule.

Figure 4. Photomicrograph of histologic specimen obtained by video-assisted thoracic surgery reveals partial filling of air spaces with cryptococcal organisms (arrows) and inflammatory cells around the nodule. Elastic fibers which indicate the localization of alveolar walls show dark orcein staining (Orcein stain, ×33).
There is one possible explanation for the absence of a reported case of pulmonary cryptococcosis with a solitary focal GGO. In the present case, a CT scan for lung metastasis only incidentally detected the GGO. Although a chest radiograph could not detect the lesion at that time, it did so only three months later as a nodule. During these three months, the patient did not complain of any symptoms. Thus, the fact that it was detected in this case entirely by accident would suggest the great difficulty in detecting the GGO of pulmonary cryptococcosis before it changes to a nodule. Thus, this may not be such a rare case after all; it may even be a common manifestation of pulmonary cryptococcosis. Our observations in this case may well contribute to a better understanding of the natural history of pulmonary cryptococcosis.

Because of unavailability of a histopathologic specimen for the initial GGO in the present case, we are unable to determine its pathology. However, we can suggest a hypothesis based on a previous paper. Zinck et al. reported that air spaces around the nodule of pulmonary cryptococcosis contain foamy macrophages and proteinaceous eosinophilic fluid collections (4). They also showed that this pathologic finding corresponds to GGO surrounding a nodule on CT. We also observed partial filling of air spaces with cryptococcal organisms and inflammatory cells around the nodule in the present case (Fig. 4), although no apparent GGO was seen to surround the nodule on HRCT (Fig. 3). These observations suggest that the initial GGO in the present case may also represent partial filling of air spaces with cryptococcal organisms and inflammatory cells.

In summary, we report a case of pulmonary cryptococcosis with solitary focal GGO on HRCT at the time of discovery. We hypothesize that the initial GGO may correspond pathologically to partial filling of air spaces with cryptococcal organisms and inflammatory cells. This case may provide a better understanding of the natural history of pulmonary cryptococcosis.

References