Pulmonary cryptococcosis presenting with a large cavity

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Keywords
Cavitation, Cryptococcus, immunocompromised host.

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Respirology Case Reports 2014; 2(2): 61–63
doi: 10.1002/rcr2.49

Abstract
A 78-year-old woman who was receiving corticosteroids for rheumatoid arthritis was admitted to our hospital to have her fever, hemoptysis, diarrhea, and chest x-ray abnormalities, which were unresponsive to antibiotics, investigated. A chest computed tomography scan revealed infiltrative shadows and a large cavity in the right lower lobe. Laboratory tests revealed a white blood cell count of 13,100/μL, a serum C-reactive protein level of 8.75 mg/dL, a serum albumin level of 1.4 g/dL, and positivity for Cryptococcus antigen. Grocott staining of a transbronchial lung biopsy specimen detected black-brown fungi. Also, a stool sample was positive for Clostridium difficile toxin, leading to a diagnosis of pulmonary cryptococcosis and pseudomembranous colitis. The patient was given 200 mg/day intravenous fosfluconazole and 1500 mg/day oral metronidazole, and her condition improved. Immunocompromised hosts with pulmonary cryptococcosis demonstrate a wide variety of radiographic abnormalities, including nodules, cavitation, and infiltration.

Introduction
Cryptococcosis is a fungal infection that can result in pulmonary involvement after the inhalation of Cryptococcus spores. Immunocompetent patients tend to exhibit peripheral nodule(s) on radiographic imaging. In contrast, immunocompromised hosts demonstrate a wide variety of radiographic abnormalities, including nodules, infiltration, consolidation, cavitation, adenopathy, and pleural effusion [1–3]. Here, we report a case of pulmonary cryptococcosis involving the formation of a large cavity.

Case Report
A 78-year-old woman was admitted to another hospital because of general fatigue in January 2012. She had been receiving corticosteroids (5 mg/day prednisolone) for rheumatoid arthritis for 3 months. A chest x-ray and computed tomography (CT) scan depicted regions of airspace consolidation in the right lower lobe (Figs. 1, 2, left). Thus, bacterial pneumonia was suspected, and intravenous antibiotics, including 6 g/day ampicillin/subactam, 13.5 g/day piperacillin/tazobactam, and 1.5 g/day meropenem, were administered for more than 2 months; however, the patient’s radiographic findings did not improve, and she developed fever, hemoptysis, and diarrhea. Thus, she was transferred to our hospital for investigation and treatment in March. A physical examination demonstrated the following results: temperature: 37.2°C, oxygen saturation level: 95%, and blood pressure: 82/41 mm Hg. A chest CT scan revealed regions of consolidation and a large cavity (70 × 50 mm in diameter) in the right lower lobe (Fig. 2, middle). In addition, laboratory tests detected a white blood cell count of 13,100/μL, a serum C-reactive protein level of 8.75 mg/dL, a serum albumin level of 1.4 g/dL, and a serum carcinoembryonic antigen level of 1.3 ng/mL. Furthermore, serological tests produced negative results for human immunodeficiency virus and (1-3)-β-D glucan (<11.0 pg/mL), but a positive result for Cryptococcus antigen. Cultures of the patient’s sputum were positive for Klebsiella pneumoniae (1+) but negative for fungal and mycobacterial pathogens. Also, a stool sample was found to be positive for Clostridium difficile toxin. To rule out tuberculosis, aspergillosis, lung cancer, and other diseases, bronchoscopy was performed. Grocott staining of a transbronchial lung biopsy specimen obtained from the
abovementioned cavity detected black-brown fungi. Based on these results, the patient was diagnosed with pulmonary cryptococcosis and pseudomembranous colitis, and treatment with intravenous fosfluconazole (loading doses of 400 mg on days 1 and 2 followed by 200 mg for 20 days) and oral metronidazole (1500 mg/day for 6 weeks) was started. As a result, her condition, laboratory data, and radiographic findings gradually improved. Then, the 200 mg/day intravenous fosfluconazole was switched to 400 mg/day oral fluconazole and the patient was discharged in May. By November, the large cavity had disappeared (Fig. 2, right). Oral fluconazole has been continued until now.

**Discussion**

Pulmonary cryptococcosis is known to occur in people with acquired immunodeficiency syndrome and those in immunocompromised states, such as patients undergoing organ transplantation or those on immunosuppressive regimens; however, it can also occur in immunocompetent subjects. Single or multiple pulmonary nodules are the most common findings in immunocompetent hosts, whereas immunocompromised hosts demonstrate a wide variety of radiographic abnormalities, including single or multiple nodules that progress to confluence and/or cavitation, segmental consolidation, bilateral bronchopneumonia, or

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**Figure 1.** Time course of the patient’s chest x-ray findings showing consolidation shadows in the right lower lung field (left, January; middle, March; and right, November).

**Figure 2.** Time course of the patient’s chest computed tomography findings (left, January; middle, March; and right, November). The regions of airspace consolidation combined to form a large cavity (diameter: 70 × 50 mm), which improved after antifungal therapy.
mixed patterns [1]. A previous study reported that cavi-
tation within nodules and parenchymal consolidation
were significantly less common in immunocompetent
patients than in immunocompromised patients [2]. In
another retrospective evaluation of 76 patients with a
tissue-confirmed pulmonary cryptococcosis, including 35
immunocompromised and 41 immunocompetent patients,
cavitation was significantly more common among the
immunocompromised patients (eight patients) than among
the immunocompetent patients (two patients) [3].
In the present case, an immunocompromised patient
with rheumatoid arthritis had been treated with several
antibiotics for bacterial pneumonia for 2 months; however,
the regions of airspace consolidation within her right lung
were unresponsive, and a cavity measuring 70 × 50 mm in
diameter developed. Finally, she developed pseudomem-
branous colitis with severe hypoalbuminemia. Fortunately,
after being diagnosed with pulmonary cryptococcosis and
treated accordingly, her condition gradually improved. This
case indicates the importance of reevaluating the causative
pathogen in cases of infection in which the initial treatment
fails to produce a response.
In conclusion, clinicians should keep in mind that: (1) in
immunocompromised patients, pulmonary cryptococcosis
can present as regions of airspace consolidation that progress
to cavitation; and (2) fungal infections have to be ruled out in
cases of pulmonary infection involving infiltrative shadows
or cavitation that are unresponsive to antibiotics.

Disclosure Statements
No conflict of interest declared.
Appropriate written informed consent was obtained for publica-
tion of this case report and accompanying images.

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