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Case report

Isolated *Candida* infection of the lung

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A B S T R A C T

Candida pneumonia is a rare infection of the lungs, with the majority of cases occurring secondary to hematological dissemination of *Candida* organisms from a distant site, usually the gastrointestinal tract or skin. We report a case of a 77-year-old male who is life-long smoker with a history of rheumatoid arthritis and polymyalgia rheumatica, but did not take immunosuppressants for those conditions. Here, we present an extremely rare case of isolated pulmonary parenchymal *Candida* infection in the form pulmonary nodules without evidence of systemic disease which has only been described in a few previous reports.

Introduction

Candida is a part of the normal oropharyngeal flora and upper respiratory tract. Candida pneumonia, however, is a rare infection of the lungs most commonly seen as part of a disseminated *Candida* infection associated with predisposing clinical circumstances, such as long-term antibiotic use, hematologic malignancy, or severe immunosuppressive states [1,2]. The majority of Candida pneumonia cases are secondary to hematological dissemination of *Candida* organisms from a distant site, usually the gastrointestinal tract or skin [3]. Diagnosis of pulmonary candidiasis is difficult because there is no specific clinical or radiological presentation. Moreover, the presence of *Candida* in sputum or other respiratory tract specimens often represents contamination [4]. A definitive diagnosis of Candida pneumonia relies on pathological findings of pulmonary parenchymal invasion in histopathological samples [5,6]. There is no clear definition or clinical predictive model to differentiate Candida pneumonia from other forms of candidiasis. Furthermore, Candida pneumonia has a high morbidity and is often fatal. Here, we present a rare case of *Candida* infection in the form of pulmonary nodules in an apparently healthy individual.

Case presentation

A 77-year-old white male presented with multiple pulmonary nodules. He is a life-long smoker with a history of rheumatoid arthritis and polymyalgia rheumatica, but did not take immunosuppressants for those conditions. The nodules were discovered via chest computed tomography to investigate the recent onset of dyspnea. His dyspnea was associated with coughing up copious amounts of yellowish to dark sputum. There were no complaints of fever, night sweats, weight loss, chest pains, or hemoptysis. He was treated for pneumonia, but the suspicious pulmonary nodules triggered further examination by positron emission tomography (PET) to evaluate the risk of cancer. The PET scan revealed the nodule was PET-avid indicating an increased risk of malignancy. An initial biopsy of the most suspicious spiculated nodule (1.3 cm) was negative. Given the increased risk of malignancy, a second biopsy was obtained. During this time, the patient did not show significant symptomatic improvement. The second biopsy showed Acute and chronic granulomatous inflammation with Caseous necrosis.

The GMS stain reveals numerous yeast forms showing wide variation in size and shape with scatted budding and rare very early hypheal type structures. Many stain lightly with mucin but show no halos. This is consistent with a Candida species possibly glabrata.

Management and outcome

The patient began fluconazole to treat his invasive Candida pneumonia. Due to the absence of immunosuppression, investigations were initiated to rule out an acquired or mild inherited immunodeficiency disorder. A skin candida delayed

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hypersensitivity test (Candin) was performed and revealed anergy to *Candida* elements. The patient's Immunoglobulin G (IgG) levels were mildly decreased to 693 (lower normal limit, 765), and he was initially lymphopenic without leukopenia (total lymphocyte count, 1400). Although his CD4 count was normal, his naïve CD4 count was only 4%, and his total B cell count was reduced. This indicated an acquired form of relative immunodeficiency prohibiting the patient from mounting immune responses to newly encountered pathogens and is probably the cause of his low IgG levels. After 6 months of fluconazole treatment, all nodules showed significant regression, and his symptoms have greatly improved with the exception of a chronic cough with production of clear sputum which was attributed to his chronic obstructive pulmonary disorder. From initial evaluation to extended 18-month follow-up, the patient did not exhibit any sign of disseminated candidiasis.

Discussion

Although the diagnosis of isolated Candida pneumonia is rare, the presence of *Candida* on pathological samples should never be ignored. Our case represents a singular occurrence of Candida pneumonia with an uncommon manifestation. Unlike known presentations, including aspiration-related asbcesses, lobar infiltrate pneumonia, or hematologic dissemination, our case involved an isolated parenchymal infection in the form of pulmonary nodules without evidence of systemic disease, which is extremely rare and only described in a few previous reports [7]. Interesting, the low level of immunodeficiency we identified in this case might have been responsible for the increased risk of infection [8,9]. However, this cannot be clearly confirmed given the lack of dissemination and repeated infection. On the contrary, the absence of repeated or chronic infection causes us to doubt whether his level of immunodeficiency is clinically relevant. Alternatively, the lack of severe immunodeficiency likely prevented dissemination and helped contain an often fatal disease without apparent systemic symptoms.

Another interesting aspect of this case was the need for two biopsies to secure a diagnosis, which is often not possible. With a case like ours, we wonder how an effective diagnosis could have been made otherwise. Since *Candida* growth in the sputum is almost always considered contamination, sputum cultures are not especially useful. Even though fungal serology was negative in this case, these tests are known to be insensitive in healthy individuals. Likewise, predictive models which differentiate infection from contamination are also very insensitive and non-specific. Thus, there is currently a definite need to develop a clinical model that enables reliably accurate identification and treatment of *Candida* infections without the need for multiple biopsies.

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