A pulmonary mycetoma is a round to oval-shaped mass of fungi situated within a cavity in the lung. Most mycetomas are caused by *Aspergillus* species. Other fungi have occasionally been reported to cause clinically and roentgenographically similar lesions. We report a case of pulmonary mycetoma caused by *Candida albicans*. Review of the literature suggests that pulmonary mycetoma due to this species is uncommon, and when it has been suspected, specific documentation has been lacking.

A pulmonary mycetoma usually results from saprophytic growth of an *Aspergillus* species in a chronic cavity in the lung; however, other fungal species have been infrequently involved [1]. Although *Candida* species are common pathogens, they have rarely been associated with this type of infection. We report a case of pulmonary mycetoma due to *Candida albicans*.

**Case Report**

A 50-year-old man was referred for evaluation of a change that had been noted on his chest roentgenograph. He did not have any symptoms. Four years earlier, he had been admitted to a community hospital with cavitary pneumonia of the right upper lobe. He was treated for aspiration pneumonia with intravenous penicillin, and a chronic cavitary deformity remained in the right upper lobe. He had received follow-up by means of serial chest roentgenography that was performed annually. The third chest roentgenograph showed a mass lesion within the cavity (figure 1). A CT scan of the chest confirmed the presence of an oblong, dependent soft-tissue mass within the cavity (figure 2).

A tuberculin test with PPD and positive anergy control was negative. Bronchoscopy with brush biopsy and bronchoalveolar lavage was performed under fluoroscopic guidance. The collected material showed short nonseptate hyphal elements and budding yeast forms suggestive of *Candida* species. Culture yielded pure growth of *Candida albicans*. Identification of the species was confirmed by the New York State Department of Health Mycology Laboratory. No acid-fast bacilli were recovered by smear or culture. Serum antibody tests were negative for *C. albicans*, *Aspergillus fumigatus*, and *Aspergillus niger*.

No specific treatment was rendered. Findings on repeated chest roentgenography at 8 months were unchanged. The mycetoma persists, but the patient has remained asymptomatic more than 24 months after evaluation.

**Review and Discussion**

Although *Candida* species have been mentioned as an occasional cause of pulmonary mycetoma, most reports are old, confirmation of the pathogen by culture has been lacking, and when culture is successful, species other than *C. albicans* have been recovered [2, 3].

*Aspergillus* species cause most pulmonary mycetomas. Other fungi can cause similar lesions; reports mention *Pseudallescheria boydii*, *Mucoraceae*, *Coccidioides immitis*, *Histoplasma capsulatum*, *Blastomyces dermatitidis*, *Sporothrix schenckii* [4], and *Blastochizomyces capitatus* [5] as causes of pulmonary mycetoma. In many reports little distinction is made between invasive fungal infection and the minimally invasive fungus ball.

*C. albicans* is a common fungal pathogen that infects mucocutaneous and urinary sites more often than it infects the lung. In contrast to *Aspergillus* species, it generally grows as a budding yeast; mycelial forms can also be seen in clinical specimens. *Candida* species have caused fungus balls in other organs, including the gallbladder [6] and the urinary tract [7]. In spite of its ubiquitous distribution, convincing evidence for pulmonary mycetoma due to this pathogen is rare.

A MEDLINE search of the English-language literature did not reveal any recent reports of *Candida* species as a cause of pulmonary mycetoma. Schwarz et al. [8] reported four cases of pulmonary mycetoma and reviewed the literature of so-called aspergillomas in 1961. Among 58 cases, they identified...
two in which a fungus ball was possibly due to *Candida* species. In one case, originally reported by Graves and Millman [9], a "monilial-like" organism was recovered from the sputum of a man with a large lung cavity. A needle biopsy was performed, and the lesion was subsequently resected. The organism was described as resembling *Aspergillus* morphologically, but cultures of the tissue were sterile.

In the other case, which was one of four involving fungus balls that were originally reported by Levin [10], the organism was morphologically "possibly *Candida* or a *Phycomycetes* species." Attempts at culture were unsuccessful. In another two of the four cases, organisms were found at resection that were "indistinguishable" from those found in the first case. All cultures were negative, and the fungi were termed "unidentified."

Lodin [11] reported a 1956 case of pulmonary mycetoma that contained a calcified mass from which *Candida* species were recovered. There is no reference to culture, and it is presumed that identification was morphological. Kennedy [12] reported a case of bronchopulmonary moniliasis in a patient with a cavity in the superior segment of the left lower lobe. *C. albicans* was recovered from the sputum, but no fungus ball was found on resection, although the cavity contained spore forms with mycelia that were consistent with *C. albicans*. Distinct "small black particles" seen in the sputum that are not typical of *Candida* species suggest that another pathogen caused this case of pulmonary mycetoma.

More recently, Watanakunakorn [13] reported a case of acute pulmonary mycetoma due to *C. albicans* in a patient with a relapse of acute myelogenous leukemia. However, in this case the patient was granulocytopenic and had no preexisting cavity; the lesion, including the cavity, responded to systemic antifungal therapy.

In the case described herein, *C. albicans* was identified morphologically on pathological examination of specimens, and this identification was confirmed by culture. No other organisms were identified. Mycetomas are rarely visualized endoscopically [14], but there was no question that the specimens obtained by bronchoscopy were representative of pulmonary mycetoma since the procedure was performed with fluoroscopic guidance. Virtually all patients with aspergillus pulmonary mycetoma have serum precipitins to *Aspergillus* species [15]. Our patient's negative test for serum precipitins to *A. fumigatus* and *A. niger* made concomitant aspergillus infection unlikely. Our patient also was negative for agglutinins to *Candida* species. Precipitins to *Candida* species are formed only in response to systemic infections, and hence this finding is expected [16]. We believe that this is the first case of *C. albicans* pulmonary mycetoma in which the diagnosis was established beyond a reasonable doubt both by morphology and by culture.

References