We report a case of fungus ball due to *Pseudallescheria boydii* (pseudallescherioma) associated with systemic lupus erythematosus. Direct microscopical examination revealed a fungus with broad septate hyphae resembling *Aspergillus* and the fungus was identified as *P. boydii* on culture. Surgical resection was required to control episodes of hemoptysis. Cases of pulmonary pseudallescheriasis are rare, especially in Japan. However, some cases previously diagnosed as pulmonary aspergillosis may have been found to be caused by *P. boydii*, if adequate culture studies had been conducted. Unlike *Aspergillus*, *P. boydii* is resistant to amphotericin B. Therefore, we emphasize the importance of a correct diagnosis based on culture examination.

(Key words: *Pseudallescheria boydii*, fungus ball, *Aspergillus*)

**Introduction**

*Pseudallescheria boydii* is a ubiquitous soil fungus. Most pseudallescheriasis occurs as a mycetoma (maduromycosis) and *P. boydii* is the leading cause of mycetoma in the United States, Canada, and temperate regions of the world. It is also reported to cause disseminated disease, respiratory infection, endocarditis, sinusitis, meningoencephalitis, brain abscess, and endophthalmitis. Furthermore, *P. boydii* is an important cause of infection in immunocompromised persons (1).

Cases of pulmonary pseudallescheriasis have been described mainly in individuals from rural areas who have been injured in some way or who have accidentally ingested contaminated water. *P. boydii* is also found within pulmonary cavities, where it forms matted collections of fungal hyphae, variously termed fungus balls or fungomas (2). These cases, pseudallescheriomas, resemble fungus balls of *Aspergillus*. We report a case of lung cavity with fungus balls due to *P. boydii* associated with systemic lupus erythematosus (SLE) which developed in the lung cavity after the patient had received treatment for pulmonary tuberculosis for 1 year. Few cases of pulmonary pseudallescheriasis have been reported previously, especially in Japan, and the pathological importance of this disease is largely unrecognized. This report describes what appears to be the sixth case of pulmonary pseudallescheriasis in Japan (3–6).

**Case Report**

In March 1983, a 24-year-old Japanese man was admitted to the University Hospital of Tokyo Medical and Dental University because of acute renal failure associated with SLE. The L.E. cell test was positive, and the titer of antinuclear antibody was 1:40. The blood urea nitrogen level was 71 mg/dl, the creatinine 2.7 mg/dl, and the potassium 6.6 mEq/l. One month later, his renal function deteriorated further, and hemodialysis was initiated. A high dose of methylprednisolone was given intravenously, followed by an oral regimen of prednisolone, 60 mg/day, and azathioprine, 100 mg/day. The patient responded to treatment, and the dosage of prednisolone was gradually tapered to 25 mg/day. Four months later, a low grade fever developed, and a chest roentgenogram showed nodular shadows in the right upper lobe and left middle lobe. A transbronchial biopsy was performed, yielding a pathological diagnosis of cryptococcosis. Miconazole was given intravenously but it was discontinued due to deteriorating renal function. He was discharged in October 1983 and followed up as an outpatient. Prednisolone was given in a maintenance dose of 15 mg/day.

In 1984, he was readmitted to our hospital because of pulmonary infection due to *Mycobacterium tuberculosis*. A chest X-ray film revealed a large cavity in the right upper and lower lobes. The patient was treated with 300 mg isoniazid, 450 mg rifampicin, and 750 mg ethambutol. The patient was discharged and received the same medication for a total of 1 year.
A thin-walled cavity in the right lower lobe formed as a result of healing. One year later, the dose of prednisolone was reduced to 10 mg/day.

The patient was admitted again in January 1992 because of blood-streaked sputum. Neither physical findings nor laboratory data indicated exacerbation of SLE. Laboratory studies showed a red blood cell count of $359 \times 10^6/\mu l$, a leukocyte count of $7,500/\mu l$, and a platelet cell count of $25.3 \times 10^9/\mu l$. The blood urea nitrogen level was 48 mg/dl, creatinine 2.8 mg/dl, and potassium 5.5 mEq/l. A chest X-ray film revealed the development of a fungus ball in the cavity of the right lower lobe (Fig. 1). Computed tomographic and bronchographic examinations confirmed the presence of a cavity with a fungus ball in the right lower lobe (Figs. 2, 3). Bronchoscopy revealed drainage from the cavity, with leakage of blood from the right lower lobe bronchi. The direct examination of the Gram-stained materials aspirated from the right lower lobe by bronchoscopy revealed a fungus with broad septate hyphae resembling *Aspergillus*. After two days of incubation at a temperature of 35°C, floccose and grayish white colonies grew on Sabouraud’s agar. The microscopical examination of the slide culture materials revealed branching septate hyphae with egg-shaped conidia produced singly on short hyphae and on elongate conidiophores (Fig. 4). All of these features led to an identification of *Scedosporium apiospermum*, the asexual form of *P. boydii*. Antibody to *Aspergillus* in the sera assessed by the complement fixation test was negative. Transbronchial intracavitary infusion of amphotericin B was initiated and continued until the fungus was identified as *P. boydii* (total dose 90 mg). Although administration of fluconazole (200 mg/day for 7 months) and flucytosine (2,000 mg/day for 6 months) was initiated, there was no demonstrable change in the radiologic appearance of...
Figure 4. **Scedosporium apiospermum**, an anamorph of *Pseudallescheria boydii*. Single-celled conidia can be seen on short hyphae and on elongate conidiophores (cotton blue stain).

Figure 5. A section of the contents of the cavity, showing branching septate hyphae (HE stain, ×400).

Discussion

*P. boydii*, previously termed *Allescheria boydii* and *Petriellidium boydii*, belongs to the Division Ascomycota. The anamorphic state of *P. boydii* is *Scedosporium apiospermum*, previously known as *Monosporium apiospermum*.

Cases of pulmonary pseudallescheriasis appear identical clinically, radiologically, and histologically to pulmonary aspergillosis. Cough, hemoptysis, malaise, and a preexisting tuberculous process were present in the majority of the cases reported in the literature. Pulmonary infiltration, with and without cavitation, and a fungus ball was often seen radiologically in cases of pulmonary pseudallescheriasis as well as pulmonary aspergillosis. Although the detection of antibodies to *Aspergillus* can be an aid in avoiding the confusion in immunocompetent patients, mixed infection with *Aspergillus* and *P. boydii* could be an additional problem (8, 9). Some patients were found to have precipitating antibody to antigens from *P. boydii* (10). Recent studies have demonstrated that the use of oligonucleotide probes specific for a variety of ribosomal RNA sequences may help in rapidly diagnosing *Aspergillus* by distinguishing it from other medically important fungal pathogens (11). However, these techniques are not routine procedures.

In histopathological sections, some differences between *P. boydii* and *Aspergillus* were reported: 1) The hyphae of *P. boydii* are somewhat narrower (2 to 5 µm) than those of *Aspergillus* and exhibit a branching pattern that is not progressive and is generally more haphazard than that of most hyaline Hyphomycetes (12). 2) Although conidial heads are often seen in tissue in pulmonary aspergillosis, no conidia are observed in pseudallescheriasis (13). 3) Both *P. boydii* and *Aspergillus* can produce fungus balls and invade the bronchi. *P. boydii* generally causes more severe injury to the tissue and penetrates deeper into the bronchi than *Aspergillus* (13). However, these differences are slight and it is not possible to accurately distinguish the hyphal forms of *P. boydii* from those of *Aspergillus* only by direct microscopical examination.

Culture is important to establish the correct diagnosis. *P. boydii* is characterized by septate hyphae and single-celled conidia produced on short hyphae and on elongate conidiophores (6). Cases of pulmonary pseudallescheriasis are relatively rare. Some cases previously diagnosed as pulmonary aspergillosis may have been found to be caused by *P. boydii*, if adequate culture studies had been conducted.

Unlike *Aspergillus*, *P. boydii* is usually markedly resistant both *in vitro* and clinically to amphotericin B but is sensitive to imidazoles (ketoconazole, miconazole) (14). However,
Cunningham and Mitchell reported a case of soft tissue infection due to *P. boydii* that responded to amphotericin B treatment despite resistance *in vitro* (15). Gugnani et al reported a case of eumycetoma due to *P. boydii* who was treated successfully with fluconazole (16). Recently, it was reported that cases of pneumonia due to *P. boydii* were successfully treated with oral itraconazole (17). However, in 1992, itraconazole was not available in Japan, and thus we chose surgical resection to control hemoptysis. After resection, there was no evidence of recurrence. Jung et al (18) proposed guidelines for the management of pulmonary pseudallescheriasis: 1) Resectional surgery is the treatment of choice for a localized cavitary lesion with mycetoma. 2) Death and complications depend on underlying disease rather than pseudallescheriasis. 3) Preoperative and postoperative antifungal drug treatment is not necessary. The present case of pulmonary pseudallescheriasis once again emphasizes that one of the most satisfactory treatments for this mycosis is surgical excision of the infected area. However, these guidelines were proposed in 1977 and since then many new anti-fungal drugs have been developed. Therefore, on the basis of correct diagnosis, further studies are required to determine new guidelines for the management of pseudallescherioma.

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References


