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## Correspondence

# Solitary pulmonary nodule in a renal transplant recipient



## KEYWORDS

*Cunninghamella bertholletiae*;  
Mucormycosis;  
Solitary pulmonary nodule

## Dear Editor

A solitary pulmonary nodule (SPN) is an isolated radiographic opacity <3 cm, surrounded by lung parenchyma. The differential diagnosis of SPN is broad; one common benign etiology is infective granuloma, which may be caused by tuberculosis, coccidioidomycosis, histoplasmosis, cryptococcosis, or aspergillosis.<sup>1</sup> Herein, we report a case of a kidney transplant recipient presenting with fever and a SPN. Pulmonary mucormycosis was diagnosed.

A 42-year-old man from Taiwan presented with a three-day history of fever. He had undergone kidney transplantation two years previously, with a history of acute pyelonephritis of the transplanted kidney and acute T cell-mediated rejection (grade IIA). He received immunosuppressants with mycophenolate mofetil 500 mg twice daily, tacrolimus 2 mg twice daily, and prednisolone 20 mg once daily before this admission. Chest radiography revealed an ill-defined nodular density over the right lower lung (RLL) (Fig. 1A). No microorganisms were detected in seven-day blood culture; subsequent chest computed tomography (CT) revealed a 1.6-cm solid nodule over the RLL abutting the right major fissure (Fig. 1B). Bronchoscopic examination showed little secretion, and endobronchial ultrasonography showed no lesions. Microscopic examination and culture of bronchoalveolar lavage fluid revealed no specific pathogens. Therefore,

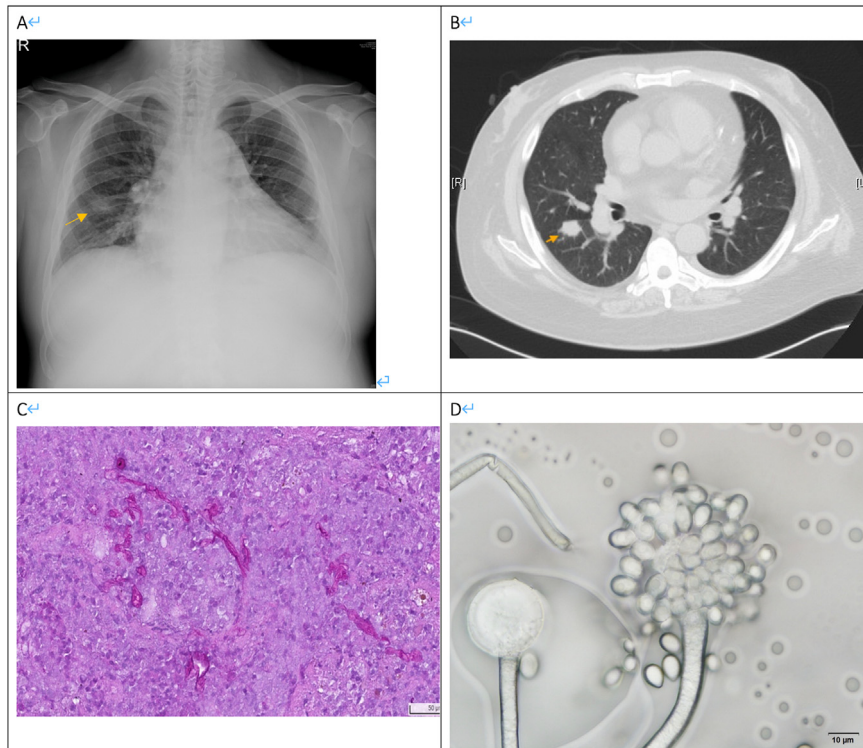
thoroscopic wedge resection of RLL was performed. The histopathologic diagnosis was necrosis with acute and chronic inflammation. Broad branching fungal hyphae were identified by periodic acid–Schiff stain (Fig. 1C). Mold isolates recovered from lung tissue were identified based on morphological characteristics and sequence analysis of the internal transcribed spacer region. Mucorales (*Cunninghamella bertholletiae*) was confirmed (Fig. 1D). Liposomal amphotericin B was administered for five weeks, followed by oral posaconazole for three months. Antifungal susceptibility testing was performed later using the Clinical and Laboratory Standards Institute M38-A3 broth dilution. The minimum inhibitory concentration of amphotericin B against the *C. bertholletiae* isolate was 2 µg/mL, itraconazole >16 µg/mL, posaconazole 1 µg/mL, and isavuconazole >16 µg/mL. Finally, the patient was discharged and recovered.

Invasive mold infections are well-known complications of immunosuppression in solid organ transplant (SOT) recipients. Mucorales infection rates are as high as 3% in patients with SOT.<sup>2</sup> Radiological manifestations of pulmonary mucormycosis include multiple nodules (≥10), pleural effusion, consolidation, cavitation, and reverse halo sign, a ground-glass pulmonary opacity surrounded by a ring of dense consolidation, on CT.<sup>3</sup> SNPs are not a common presentation. Global guidelines recommend early complete surgical treatment for mucormycosis along with systemic antifungal treatment. If lung resection is performed, patients may benefit from emergency surgery to prevent bleeding as well as from elective surgery, which has been shown to increase survival.<sup>4</sup> Herein, the clinician arranged an aggressive diagnostic procedure for SPN in an immunocompromised patient, obtained the diagnosis timeously, and initiated appropriate antifungal agents, thus facilitating a favorable patient outcome.

*Rhizopus* spp (47%) were the most frequent causes, followed by *Mucor* spp (18%) and *C. bertholletiae* (7%) in a global review on mucormycosis.<sup>5</sup> The geographic

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**Figure 1.** (A) Chest radiography: an ill-defined nodular density over right lower lung (RLL) (arrow) (B) Chest computed tomography: a 1.6 cm solid nodule over RLL abutting the right major fissure (arrow) (C) Histopathological examination showing broad branching fungal hyphae by periodic-acid Schiff stain (400X) (D) Microscopic morphology of *Cunninghamella bertholletiae* showing simple sporangiophores forming a swollen, terminal vesicle around which single-celled, globose to ovoid sporangia developed on swollen denticles (100X).

distribution of Mucorales species is variable. Here, the species causing pulmonary mucormycosis was *C. bertholletiae*. Amphotericin B is considered the most effective drug against Mucorales and is active *in vitro* against most species, except for *Cunninghamella* spp.<sup>4</sup> Posaconazole may be considered for the treatment of mucormycosis caused by *C. bertholletiae*.

Immunocompromised hosts have increased susceptibility to miscellaneous infections, and clinical manifestations may be non-specific. Aggressive diagnosis is necessary to avoid delayed treatment once SPN is detected in immunocompromised hosts.

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### Declaration of competing interest

The authors have no conflicts of interest to declare.

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