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Case Report

Rasamsonia argillacea species complex myocarditis in a patient with chronic granulomatous disease

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ABSTRACT

Herein, we present a case of successfully treated biopsy-proven *Rasamsonia argillacea* species complex myocarditis, pericarditis, and pulmonary infection in a 35-year-old male with a history of chronic granulomatous disease. Computed tomography of the chest demonstrated numerous pulmonary nodules and mass-like pulmonary lesions, and subsequent cardiac magnetic resonance imaging demonstrated an infiltrating mass-like lesion within the interventricular septum and pericarditis. Endobronchial, thoracoscopic, and eventual myocardial biopsies with cultures were ultimately reported as positive for *R. argillacea* species and the patient was treated with tailored antifungal therapy resulting in a significant therapeutic response upon short interval follow-up. This case stresses the importance of recognizing unusual thoracic imaging manifestations of an atypical fungal infection in immunocompromised individuals in order to expedite treatment of an otherwise potentially fatal disease.

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Introduction

Fungal myocarditis and pericarditis are extremely rare infections, seen more commonly in immunocompromised individuals in the setting of disseminated disease and fungemia rather than isolated cardiac infection [1]. Nonspecific symptoms of fungal myocarditis are malaise, weakness, fever, and night sweats. More specific symptoms of end-organ damage from distal septic embolization may also be seen. The most common causative organisms in myocardial and pericardial fungal infections are *Candida* and *Aspergillus* species [2].

In this case report we are presenting a 35-year-old male patient with a history of chronic granulomatous disease (CGD)

and ulcerative colitis complicated by *Rasamsonia argillacea* species complex infection of the lung, myocardium, and pericardium. To the best of my knowledge, this is the first case report of imaging manifestation of *R. argillacea* species complex myocarditis, pericarditis, and pulmonary infection.

Case presentation

The patient is a 35-year-old male with a history of CGD and ulcerative colitis (prescribed sulfasalazine at the time of admission) who was admitted to the hospital with persistent fevers, night sweats, weight loss, tachycardia, and

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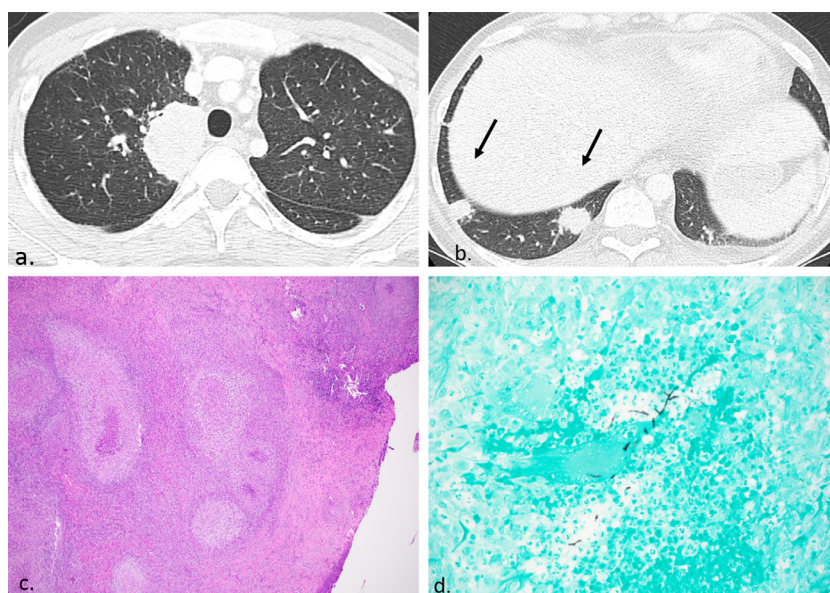


Fig. 1 – Axial CT images in lung window at initial presentation demonstrate a mass-like nodular opacity at the right upper lobe (a) and nodular lesions at the level of the right costophrenic recess (b, black arrows). Panel c (4x) shows a representative hematoxylin-eosin stained section of the biopsy specimen showing organizing, necrotizing, granulomatous, and suppurative pneumonitis with corresponding silver stain highlighting the septate branching hyphae (d, 40x).

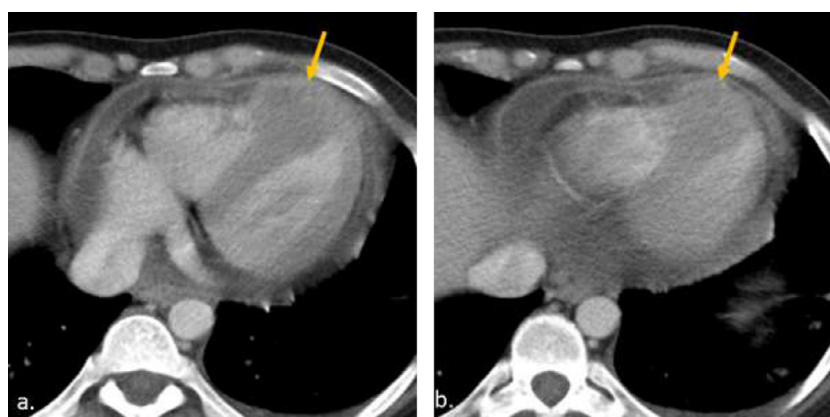


Fig. 2 – One week after initial presentation. Axial contrast-enhanced CT images of the thorax shows a pericardial effusion with contrast enhancement of the visceral and parietal pericardium and a mass-like lesion arising from interventricular septum near the apex of the heart (arrow).

fatigue. Contrast-enhanced computed tomography (CT) of the chest and abdomen was performed to identify a potential source of infection. CT images at that time demonstrated pulmonary nodules and mass-like lesions in all lobes of both lungs (Fig. 1a and b). Subsequently, the patient underwent an endobronchial ultrasound-guided biopsy of a right upper lobe paramediastinal lesion. The tissue culture was reported positive for *Penicillium* species. The patient was then discharged on a treatment regimen consisting of trimethoprim/sulfamethoxazole and voriconazole.

Due to persistent symptoms, the patient returned to the hospital 1 week later. He then underwent a video-assisted thoracoscopic surgery for biopsy of a right lower lobe nod-

ule that showed necrotizing granulomatous, suppurative, and organizing pneumonia with many septate branching hyphae (Fig. 1c and d). Cultures were again initially reported positive for *Penicillium* species. His antifungal regimen was then changed to liposomal amphotericin B, trimethoprim/sulfamethoxazole, and posaconazole for presumed treatment failure. During this admission, the patient was also found to have developed a myocardial infiltrating mass-like lesion on a follow-up chest CT study (Fig. 2) and subsequently underwent cardiac magnetic resonance imaging (MRI) for further evaluation. The MRI demonstrated a mass-like lesion arising from the interventricular septum with extension into the epicardial fat, as well as a small pericardial effusion with

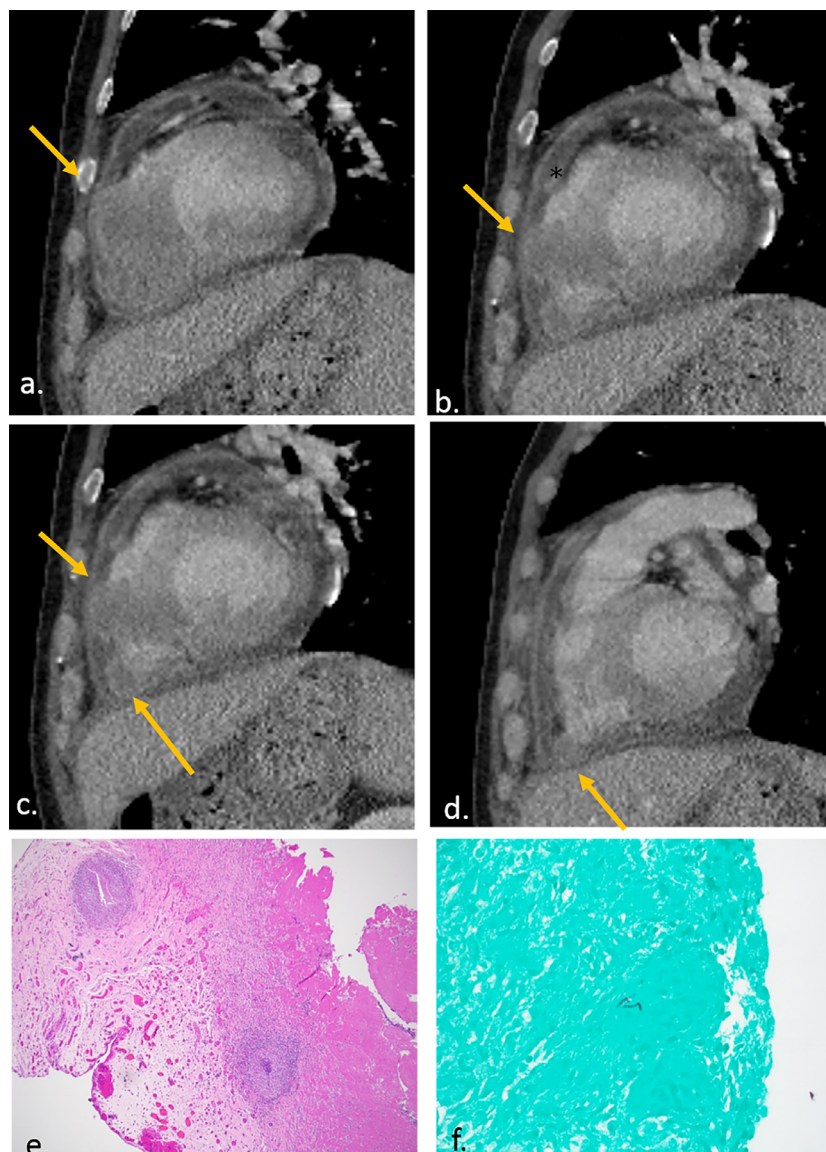


Fig. 3 – One week after initial presentation. Short axis contrast-enhanced CT images through the heart (a–d) demonstrate a mass-like lesion arising from the interventricular septum with extension into the epicardial fat (arrow). There is also a small pericardial effusion with enhancement of the pericardial surfaces (black asterisk). A biopsy of the interventricular septum mass demonstrated necrotizing granulomatous and suppurative inflammation (e, hematoxylin and eosin stain, 4x) containing rare septate branching hyphae (f, silver stain, 60x). The hyphae on this specimen were morphologically similar to those seen in the right lower lobe mass (Fig. 1c and d).

enhancement of the pericardial surfaces (Fig. 3). Biopsy of the cardiac mass revealed no evidence of malignancy, but some septate branching hyphae were present which could not be further speciated on microscopic examination alone. The patient was discharged home with a treatment regimen of liposomal amphotericin B, posaconazole, and caspofungin.

The patient was seen at an infectious disease clinic 2 months after initial presentation. Laboratory findings at that time revealed hypokalemia for which the patient was again admitted to the hospital for electrolyte repletion. His hospital course was complicated by acute kidney injury thought to be due to an incorrect formulation of amphotericin B being administered with concomitant use of furosemide, spironolac-

tone, and colchicine. Blood cultures from this hospitalization were negative.

The patient's tissue cultures of the right lower lobe and cardiac mass eventually finalized as *R. argillacea* species complex after a total of 3 different hospitalizations, the most recent of which resulting in acute kidney injury. The patient was continued on posaconazole, liposomal amphotericin B, and caspofungin. A short interval follow-up chest CT and cardiac MRI obtained 2 months after initial presentation, and subsequent antifungal therapy (Figs. 4 and 5) demonstrated a decrease in the size of pulmonary nodules, myocardial mass-like lesion, and pericardial effusion, consistent with a therapeutic response.

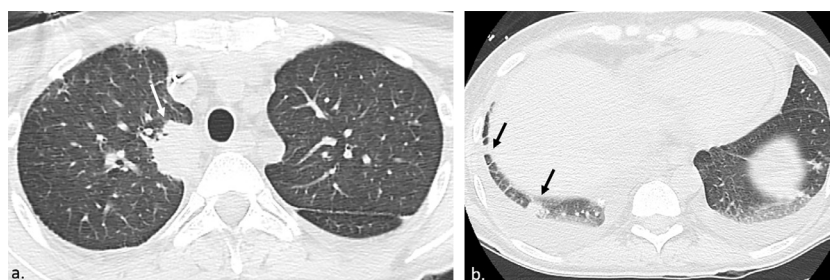


Fig. 4 – Two months after the initial presentation and initiation of antifungal therapy. Axial CT images in lung window demonstrate decrease in the size of mass-like nodular opacity at the right upper lobe (a) and nodular lesions at the level of the right costophrenic recess (b, black arrows).

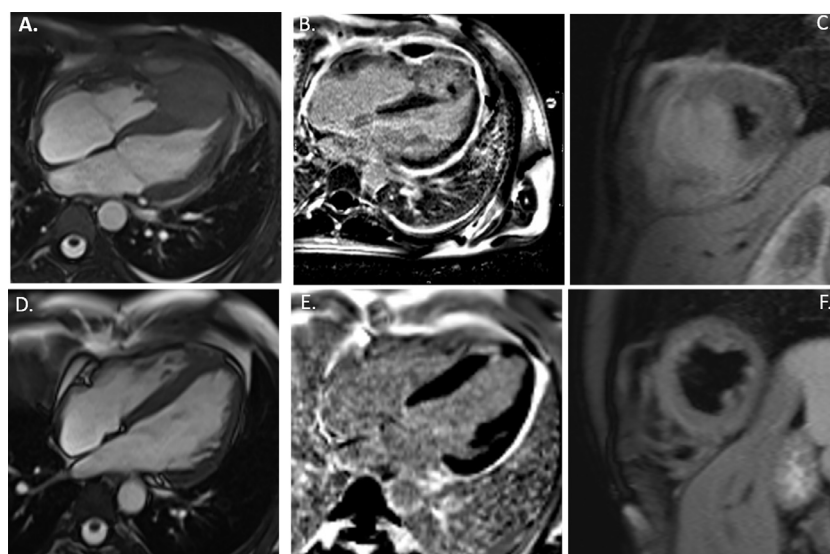


Fig. 5 – Two months after initial presentation and initiation of antifungal therapy. Cardiac MRI images in 4-chamber SSFP (A), myocardial delayed enhancement (B), and short axis Haste (C) sequences show mass-like lesion within interventricular septum, isointense on SSFPE, heterogeneously enhancing on late gadolinium imaging with necrotic regions, hyperintense compared to myocardium on Haste sequence. Corresponding follow-up images (D-F) demonstrate near complete resolution of fungal myocarditis.

Discussion

R. argillacea species complex have been regularly reported in the literature. As in our case, these fungi are frequently misidentified as *Penicillium* species [3]. CGD is underlying disease that predisposes to infection or colonization with *R. argillacea* species complex. CGD is caused by defects in the phagocyte nicotinamide adenine dinucleotide phosphate oxidase resulting in the inability of neutrophils, monocytes, and macrophages to destroy certain microbes [4]. Infections in patients with CGD are generally caused by catalase-positive fungal organisms [5]. CGD patients with fungal infection can have a lower absolute fever and a diminished leukemoid reaction which may result in detection at an advanced stage, as in our case [5]. Given *R. argillacea*'s thermotolerance and resistance to various antifungals, special attention should be paid

to chronic colonization of the airways by these fungi in CGD patients [3].

Fungal infections typically result after inhalation of spores or hyphae which are commonly found in the air [4]. Pneumonia is the most common manifestation, but patients may also have lung abscesses, empyema, and hilar lymphadenopathy [5]. Fungal pneumonia may spread locally to the ribs and spine, or metastasize to brain. Morphologic diagnosis can be misleading as organisms are often reported to be *Penicillium* species but may actually be more treatment-refractory *R. argillacea* species complex [6,7].

Fungal myocarditis is believed to be a very rare consequence of disseminated fungemia and is associated with a high mortality rate. Due to its low prevalence and high mortality, fungal myocarditis is infrequently imaged [1]. Therefore, the specific imaging features of fungal myocarditis are not well described, unlike the far more common viral

myocarditis [8–10]. Imaging features of fungal pericarditis manifest as a pericardial effusion with enhancement of the visceral and parietal pericardium (split pericardial sign) [10,11].

The treatment of fungal cardiac infections is long-term intravenous antifungal agents. Follow-up blood cultures may be useful for monitoring treatment response [5,8]. Although cardiac MR imaging has been established as a useful examination for prognostication in the setting of viral myocarditis, its utility in cases of fungal myocarditis has not yet been shown, as the natural histories of these conditions differ [12].

In patients with CGD, if we see nodules or mass-like lesion within the lungs and myocardium, *R. argillacea* species complex fungal pneumonia and fungal myocarditis should be kept in mind as part of the differential diagnosis which is crucial in correct patient management.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.radcr.2019.03.035](https://doi.org/10.1016/j.radcr.2019.03.035).

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