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CASE REPORT

ADVANCED

CLINICAL CASE

Intracardiac Aspergilloma in a Post-Transplant Patient

A Multimodal Approach to Diagnosis

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ABSTRACT

Cardiac aspergillomas are rare and associated with high mortality. We present a case of right ventricular cardiac aspergilloma in an asymptomatic renal transplant recipient. Intracavitary aspergilloma is an important consideration in evaluation of an intracardiac mass in an immunocompromised patient. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2021;3:1264–1268) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 66-year-old man with a history of renal transplantation complicated by multifocal pulmonary aspergillosis presented to our cardiology clinic (University of California-Los Angeles, Los Angeles, California) for routine follow-up of idiopathic elevated pulmonary artery systolic pressure (PASP). He had missed 2 weeks of antifungal therapy, and serial computed tomography (CT) images showed progression of the disease. Transthoracic echocardiography

(TTE) showed multiple new masses of the right ventricle (Videos 1, 2, and 3). The patient reported fatigue but denied shortness of breath or chest pain; he was admitted for expedited work-up.

On admission, the patient was asymptomatic, afebrile, and not tachycardic. He had elevated blood pressure of 156/86 mm Hg. Examination revealed a 2/4 diastolic murmur at the right upper sternal border, normal jugular venous pulsation, clear breath sounds, and no lower extremity edema.

PAST MEDICAL HISTORY

The patient had a history of type 2 diabetes mellitus, hyperlipidemia, hypertension, and end stage renal disease with renal transplantation 7 months before presentation. His post-transplant course was complicated by acute cellular rejection, which was treated with immunotherapy. Pulmonary aspergillosis was diagnosed 4 months before presentation;

LEARNING OBJECTIVES

- To make the differential diagnosis of an intracardiac mass.
- To use anatomic location to guide a multimodal diagnosis of cardiac aspergillosis.
- To understand the management of cardiac aspergillosis.

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TTE at that time demonstrated an ejection fraction of 60% to 65%, no masses, and PASP of 52 mm Hg.

INVESTIGATIONS

Laboratory data demonstrated an elevated 1,3 β -D-glucan level, negative serum galactomannan antigen, and negative blood culture results. The electrocardiogram did not show evidence of arrhythmia. Repeat TTE confirmed an ejection fraction of 55% to 60%, PASP of 52 mm Hg, mild tricuspid valve (TV) regurgitation, normal right ventricular systolic function, and mobile masses attached to the TV chordae that measured 2.0 \times 1.9 cm and 0.9 \times 0.9 cm (Video 4). Cardiac magnetic resonance (CMR) revealed 2 lobulated filling defects within the right ventricle (Figures 1A to 1G, Videos 5 and 6), later confirmed by transesophageal echocardiography (TEE) (Video 7).

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of an intraventricular mass included infective vegetation, malignant tumor such as lymphoma, rhabdomyoma, fibroma, hemangioma, myxomatous changes, atherosclerotic plaque, and healed vegetations or abscesses. Given his history of invasive aspergillosis, immunosuppression, inconsistent antifungal therapy, and progression of pulmonary lesions, cardiac aspergilloma was considered most likely.

MANAGEMENT

The patient was administered intravenous caspofungin and voriconazole. He underwent urgent mass resection and TV repair with septal and posterior leaflet commissuroplasty and ring annuloplasty. Postoperative echocardiography confirmed mass removal (Videos 8, 9, and 10). The larger, pedunculated mass measured 2.5 \times 3 cm, with bulky vegetations involving the subvalvular apparatus through attachments to the posterior and septal leaflets of the anterior papillary muscle. Pathological examination of excised tissue demonstrated septated fungal hyphae branching at 45° angles, confirming *Aspergillus fumigatus* (Figures 2A to 2D). The patient was discharged and prescribed lifelong suppressive azole therapy.

DISCUSSION

The incidence of invasive aspergillosis among renal transplant recipients is ~1%, and cardiac involvement is infrequent and often fatal (1,2). Diagnosis is challenging and requires a multifaceted approach, including a high degree of clinical suspicion coupled with advanced imaging techniques and

histopathologic confirmation (2). Autopsy reports suggest that cardiac aspergillosis may manifest in 4 types: intracavitary mass (aspergilloma); intramyocardial abscesses, valvular endocarditis, and *Aspergillus* embolization causing myocardial infarction (3). Risk factors for *Aspergillus* endocarditis are previous valve surgery, antibiotic use, immunocompromise, and malignant disease (2).

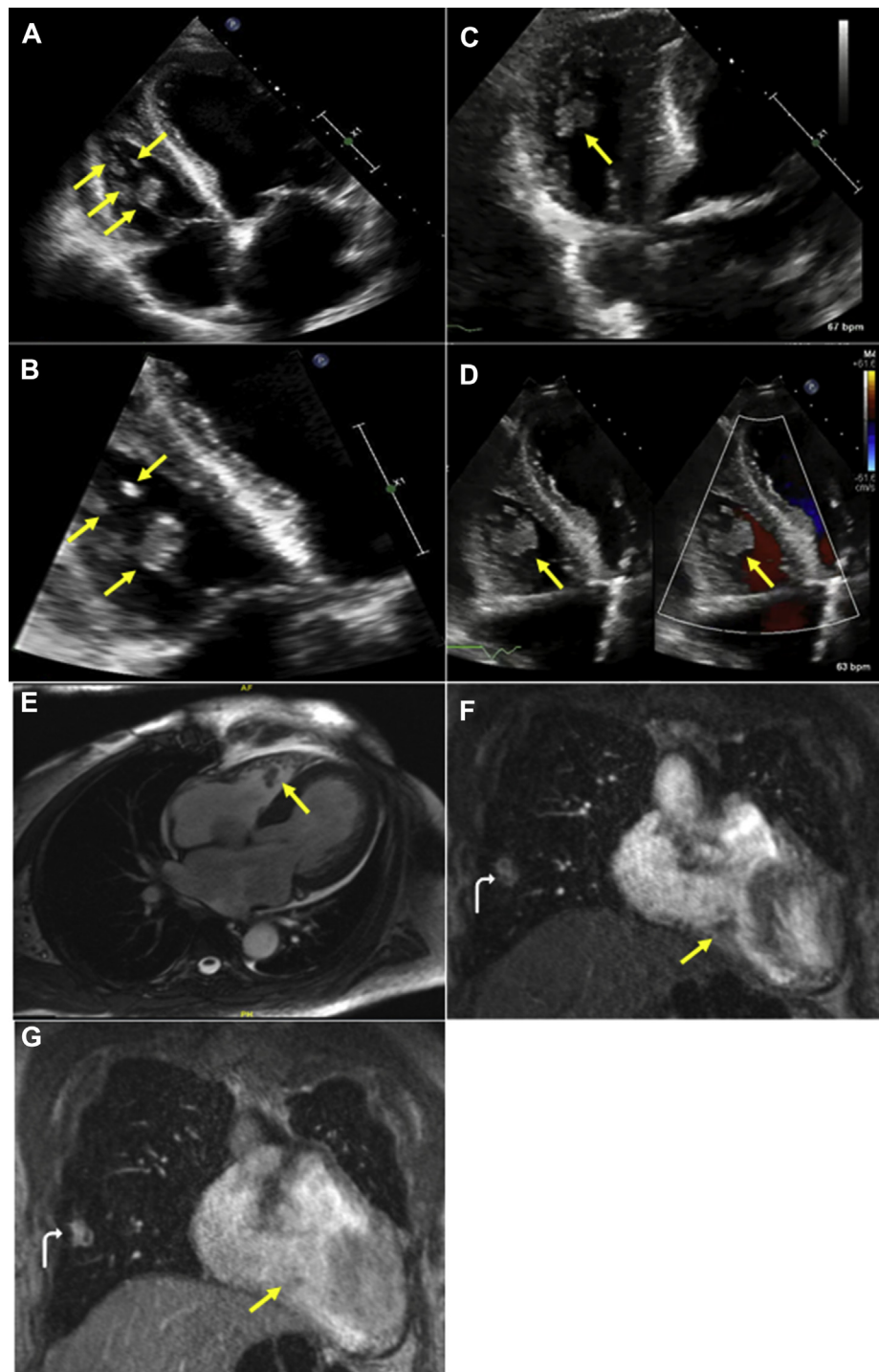
A literature review identified 18 published cases of intracavitary aspergilloma, as summarized in Supplemental Appendix. Of the 18 cases, 5 involved bilateral chambers, 11 were unilateral, and 2 involved the intraventricular septum. Eight cases did not report valvular involvement, a finding suggesting that an intracavitary mass may develop in the absence of endocarditis. The anatomic location of disease has implications for diagnostic imaging because valvular involvement warrants TEE, whereas an intracardiac mass warrants advanced anatomic imaging such as CMR (4,5).

Results of blood cultures for detection of aspergillosis are often negative; therefore, imaging and histopathologic examination are paramount for accurate diagnosis (2). The relative sensitivity and noninvasive nature of TTE make it a valuable first-line imaging modality to assess for a suspected intracardiac mass, although TEE has improved specificity. TTE has 50% to 70% sensitivity and >90% specificity for the detection of infectious endocarditis (IE) compared with >90% sensitivity and specificity for TEE. For right-sided IE specifically, the sensitivity of TTE is >80%, whereas the sensitivity of TEE may be only 84% (4,6,7).

CMR, electrocardiogram-gated multidetector CT angiography, and fluorine-18-fluorodeoxyglucose positron emission tomography CT of the chest are important advanced imaging modalities for a suspected intracardiac mass (5). CMR affords excellent assessment of tissue planes and tissue characteristics such as invasiveness, fluid accumulation, necrosis, or calcification, thus making it similar or superior to TTE in the evaluation of cardiac masses (3-5). In contrast, CMR is considered adjunctive in the diagnosis of IE (5,6). Instead, fluorine-18-fluorodeoxyglucose positron emission tomography CT may improve the detection of IE compared with TTE and clinical diagnosis alone, especially in patients with prosthetic valves. Electrocardiogram-gated multidetector CT angiography may also have sensitivity and specificity that approaches that of TEE in IE cases, with particularly improved detection of perivalvular infection (5).

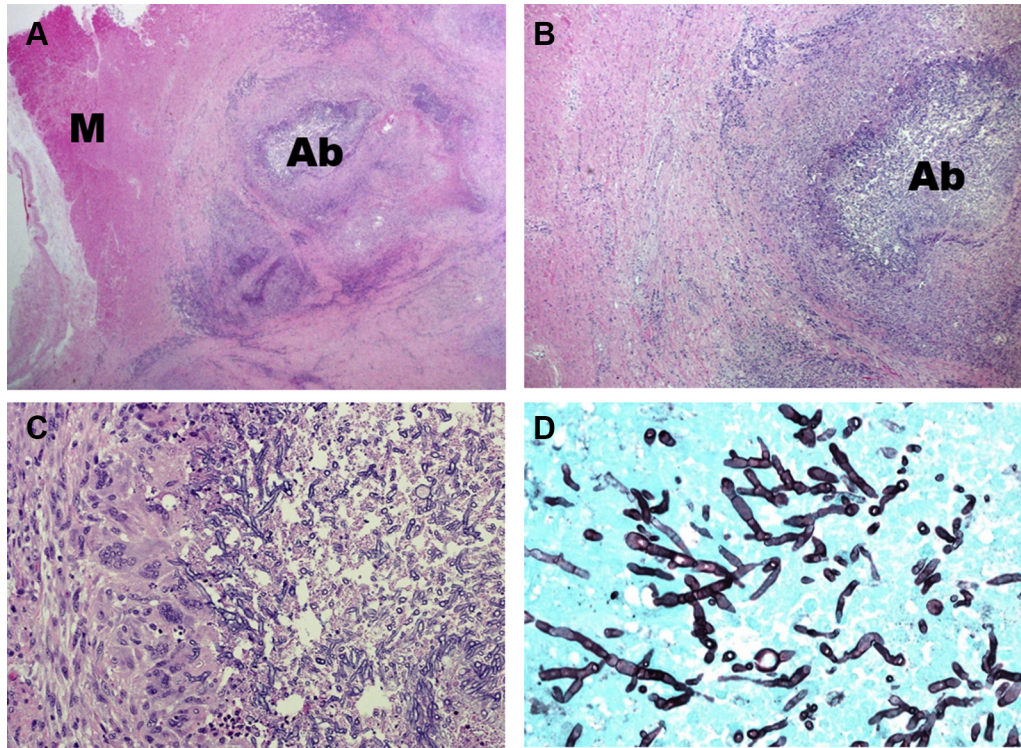
ABBREVIATIONS AND ACRONYMS

- CMR = cardiac magnetic resonance
- CT = computed tomography
- IE = infectious endocarditis
- PASP = pulmonary artery systolic pressure
- TEE = transesophageal echocardiography
- TTE = transthoracic echocardiography
- TV = tricuspid valve

FIGURE 1 TTE and CMR Views of RV Aspergilloma

(A) Transthoracic echocardiography (TTE) TTE 4-chamber view, with **arrows** showing subvalvular masses. **(B)** Dedicated right ventricular (RV) view. **(C)** Apical 4-chamber off-axis right ventricular view. **(D)** Apical-chamber view with color Doppler. **(E)** Pre-contrast cardiac magnetic resonance (CMR) long-axis view demonstrating a multilobulated mass inferior to the tricuspid valve plane. **(F)** Post-contrast high-resolution magnetic resonance angiography early arterial phase coronal image depicting a right ventricular endoluminal mass that is T₁ hypointense without enhancement. A heterogeneously enhancing mass in the right middle lobe (**white arrow**) relates to the patient's history of pulmonary aspergillosis. **(G)** On a delayed post-contrast high-resolution image, the central core remains unenhanced (**arrow**), with mild peripheral enhancement. A right middle lobe aspergilloma demonstrates progressive contrast enhancement (**white arrow**). **Yellow arrows** denote ventricular mass.

FIGURE 2 Histological Sections of Intracardiac Mass Demonstrating *Aspergillus fumigatus*



(A) Histologic sections of vegetation adherent to subendocardial myocardium (M) and central abscess (Ab). **(B)** Abscess (Ab) surrounded by inflamed fibrous tissue. **(C)** Abscess cavity containing fungal forms with surrounding granulomatous inflammation. **(D)** Fungal forms with septate hyphae branching at 45° angles.

Treatment of intracardiac *Aspergillus* requires both surgical intervention and antifungal therapy with voriconazole or lipid formulation amphotericin. Lifelong antifungal therapy should be considered to avoid recurrence. This patient's brief lapse in antifungal suppressive therapy may have contributed to his cardiac involvement; however, chest imaging indicated a new pulmonary nodule despite therapy, thus demonstrating the virulence of this disease.

CONCLUSIONS

We experienced a rare case of a hemodynamically stable patient with intracavitary *Aspergillus* in the setting of pulmonary aspergillosis. Surveillance TTE, multimodal diagnostic testing on admission, and combined surgical and medical therapy likely

contributed to his survival at 1 year. Frequent surveillance imaging in pulmonary aspergillosis is prudent given the poor prognosis of cardiac aspergillosis and the risk of disease progression despite antifungal therapy, as described in this case.

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS aspergilloma, cardiac imaging, intracardiac mass renal transplant

APPENDIX For a literature review of available cases of cardiac aspergilloma, diagnostic and treatment modalities employed, and survival time since diagnosis as well as supplemental videos, please see the online version of this article.