A rare case of angioinvasive aspergillosis aortic graft infection causing peripheral thromboembolism

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ABSTRACT

Angioinvasive aspergillosis is a fungal infection that rarely involves vascular grafts. This case illustrates a patient with a history of aortic arch Dacron graft reconstruction presenting with acute bilateral lower extremity ischemia. The patient underwent emergent open thromboembolectomy. The intraluminal contents had an atypical appearance for thromboembolism, and histologic examination was consistent with aspergillosis. Cardiac computed tomography and transesophageal echocardiography showed an aortic arch graft vegetation. Aortic graft excision and reconstruction were performed for control of the fungal source. Investigation into the etiology of thromboembolism should include consideration for septic emboli in patients with indwelling vascular grafts. When suspected, graft excision should be considered for definitive management. (J Vasc Surg Cases Innov Tech 2023;9:1-3.)

Keywords: Acute lower extremity ischemia; Aspergillosis; Embolism; Peripheral arterial disease; Vascular graft infection

Aspergillosis is a fungal infection that typically affects the lungs and causes pulmonary symptoms in immunocompromised individuals. Although bacterial infection of prosthetic aortic grafts is a well-described complication, angioinvasive aspergillosis of vascular grafts is rarely seen. In the present report, we describe the case of a patient who presented with acute bilateral lower extremity ischemia found to be related to fungal thromboemboli 14 months after hemiarch replacement with a Dacron graft to treat acute type A aortic dissection. The evaluation identified the embolic source was a focus of angioinvasive aspergillosis involving the prosthetic aortic graft. The patient's family provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

The patient was a 79-year-old man with a history of coronary artery disease, a patent foramen ovale, and type A aortic dissection. He had undergone emergent surgical repair for the type A aortic dissection, with hemiarch replacement using a Dacron graft 14 months prior to the current presentation. He subsequently developed severe aortic regurgitation and underwent aortic valve replacement with a bioprosthetic valve and concomitant coronary artery bypass grafting 7 months later. He presented to the emergency department with a chief complaint of 3 hours of bilateral lower extremity pain, coldness, and numbness. His most recent clinic visit had been 1 month prior, at which time he had had no signs or symptoms suspicious for infection. On the initial assessment, he was normotensive, with a normal sinus rhythm, but tachycardic, with a heart rate of 120 bpm. Laboratory test results were unremarkable, with a creatinine of 0.85 mg/dL and white blood cell count of 6.7×10^9/L. Physical examination revealed cool, mottled-appearing feet with decreased motor function and decreased sensation, consistent with Rutherford class IIB ischemia. Bilateral dorsalis pedis and posterior tibial artery pulses were nonpalpable, and Doppler signals were inaudible. Computed tomography angiography (CTA) identified filling defects in bilateral common femoral arteries with no contrast filling distally, even on delayed imaging. Intravenous therapeutic heparin anticoagulation was initiated with a bolus and infusion. The patient was taken emergently to the operating room. Bilateral femoral artery exposure was performed for iliofemoral thrombectomy. Completion angiography demonstrated residual filling defects at the right distal popliteal artery. Below-knee right popliteal artery exploration was performed for popliteal and three-vessel tibial thromboembolectomy. Bilateral four-compartment calf fasciotomies were also performed. The retrieved intraluminal material appeared tan and rubbery, unusual in appearance for thromboembolism (Fig 1). Therefore, it was sent for routine pathologic evaluation. On postoperative day (POD) 3, histologic examination resulted, showing septate hyphae with $<45^\circ$ dichotomous branching characteristic for *Aspergillus* (Fig 2).

An evaluation for the fungal source was initiated. Intravenous voriconazole therapy was started with an expected duration of at least 6 to 12 weeks. Serum studies were negative for

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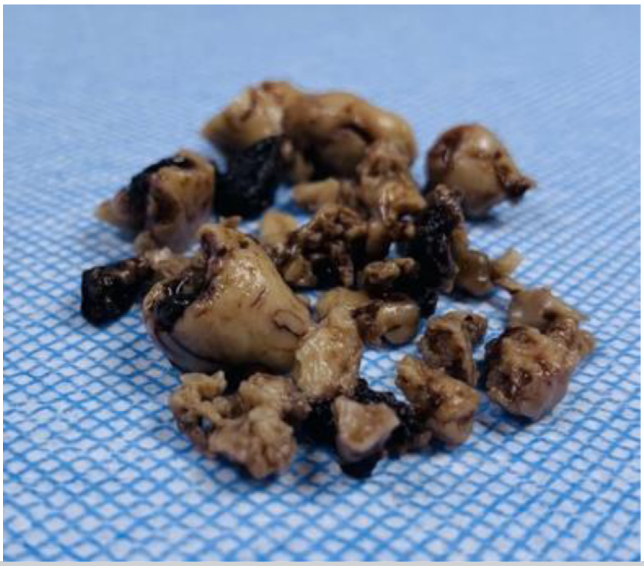

Fig 1. Thrombectomy specimen sent for histologic evaluation.

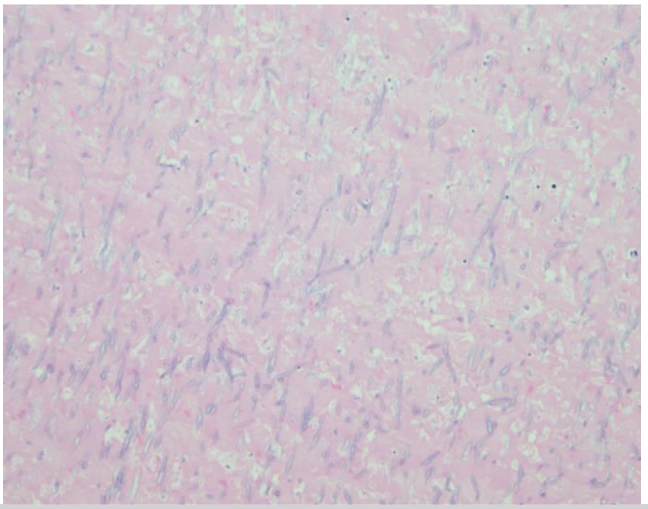

Fig 2. Histologic specimen showing septate hyphae with <45° dichotomous branching, consistent with aspergillosis.

aspergillus antibody and human immunodeficiency virus. The β-d-glucan test result was positive at 378 ng/mL. This is an antigen found in a broad range of fungal agents, including Candida spp, Aspergillus spp, and Pneumocystis jirovecii. Blood cultures and specimen fungal cultures collected on POD 3 were negative. Further workup included transthoracic echocardiography and CTA of the head, abdomen, and pelvis, with unremarkable findings. Given the patient's history of aortic repair, cardiac CTA and transesophageal echocardiography (TEE) were performed on POD 4. Both demonstrated evidence of a vegetation within the ascending aortic prosthetic graft measuring 2.6 cm × 0.7 cm × 0.7 cm. No vegetations were seen on the prosthetic aortic valve (Figs 3 and 4). After a discussion of the risks and benefits of conservative management vs aortic graft excision for fungal source control, the patient elected to proceed with ascending aortic graft excision and reconstruction using cryopreserved aortic homograft POD 15. The intraoperative tissue culture showed fungal forms on fungal smear. The patient initially did well postoperatively. He was extubated and deemed stable for transfer out of the intensive care unit to a telemetry unit. Throughout his postoperative course, he continued to receive a heparin infusion with plans for transition to oral warfarin anticoagulation prior to discharge. On POD 22 after lower extremity embolectomy and POD 10 after ascending aortic graft excision with cryograft replacement, the patient underwent complex closure of his right calf fasciotomy site. The heparin infusion was withheld for 24 hours perioperatively and then resumed. Discharge planning was in process. However, 2 days later, he reported acute onset shortness of breath with sitting up, went into respiratory distress, became unresponsive, and, subsequently, lost pulses. Despite the prompt initiation of advanced cardiac life support protocols, the patient could not be resuscitated. A postmortem examination was not performed in accordance with family preference. The differential diagnosis included pulmonary embolism.

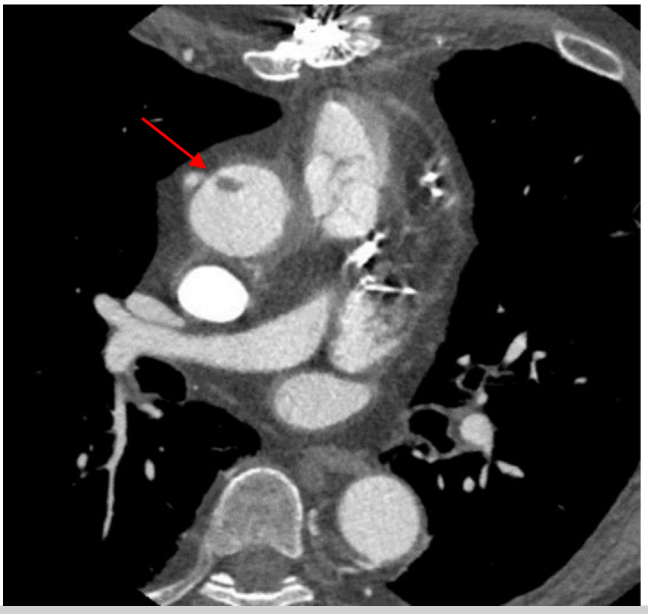

Fig 3. Cardiac computed tomography angiogram showing ascending aorta graft vegetation (*arrow*).

DISCUSSION

The present case is unusual because of the presence of peripheral thromboemboli related to angioinvasive aspergillosis. Typically, aspergillosis is a fungal infection that affects the lungs and causes symptoms in immunocompromised individuals. We have illustrated the presentation of a prosthetic aortic graft infection with *Aspergillus* in an immunocompetent patient.

Only 16 cases documenting the occurrence of vascular graft infections caused by aspergillosis species in immunocompetent patients have been reported.[1-4] Infection was identified a median of 8 months (range, 1-39 months)

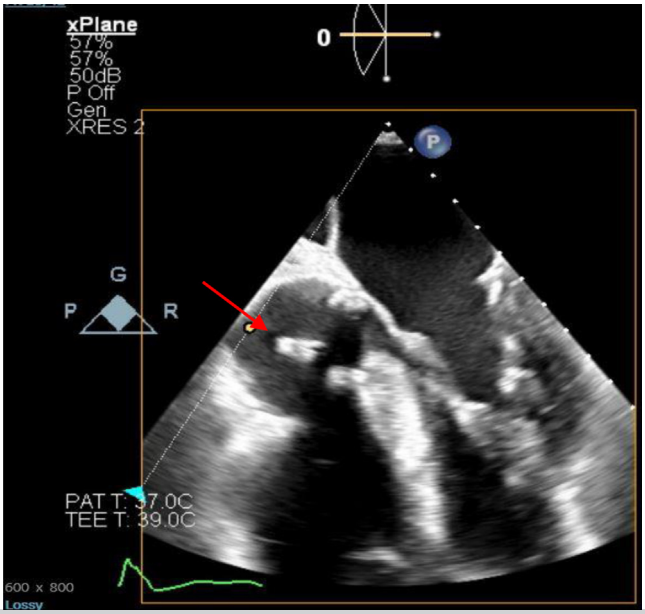

Fig 4. Transesophageal echocardiography showing ascending aortic graft vegetation (*arrow*).

after graft implantation.[5,6] Most of these patients had Dacron or polytetrafluoroethylene prosthetic grafts.[2] Graft contamination is thought to be secondary to airborne fungal contamination during graft implantation. Reported complications related to aspergillosis graft infections include pseudoaneurysm, vertebral osteomyelitis, and, most commonly, thromboembolism.[2,4-6]

The diagnosis may be challenging, given that blood cultures will typically be negative, and radiographic evidence of graft infection will not always be obvious.[1,2,4,7] Although CT studies might show evidence of infection, prior reports have shown that CT will not always elucidate the presence of infection. In cases in which graft infection is suspected despite inconclusive CT imaging findings, leukocyte scintigraphy and/or TEE can be used.[1,2,7] All prior reports have concluded that tissue culture is the most sensitive mechanism of diagnosis. Improved survival of patients with angioinvasive aspergillosis has been seen with complete graft excision and extra-anatomic bypass.[2,6] In addition, prolonged treatment with antifungal agents is essential.

Similar to previous reports of graft infection with *Aspergillus,* suspicion for fungal aortic graft infection was raised by the histologic examination findings of the emboli. In the present case, we were not dissuaded by the normal transthoracic echocardiography and initial chest CTA findings. We continued to search for source by obtaining cardiac CTA and TEE (Figs 3 and 4). It was from these imaging studies that we detected an ascending aortic graft vegetation in a timely fashion. Although limited data on fungal vascular graft infection exist, we initiated the ideal treatment algorithm, including complete graft excision and a prolonged course of antifungal therapy. The patient did not survive the perioperative period, illustrating the high mortality risk aortic graft infection is associated with.

CONCLUSIONS

Vascular graft infection with aspergillosis is rare and associated with significant morbidity and mortality risk. It is important to recognize that fungal vascular graft infection can be present in the setting of negative blood cultures; however, histologic inspection of the related thromboemboli can elucidate the proper diagnosis when fungal hyphae are identified. Imaging studies, including CTA and transthoracic echocardiography, could be inadequate to identify a fungal embolic source. Therefore, other imaging modalities, such as TEE and leukocyte scintigraphy could assist in making the diagnosis.

REFERENCES

1. Rahkonen M, Hautala T, Syväniemi E, Takalo R, Kauma H. Late-presenting vascular graft infection caused by aspergillus in an immunocompetent patient: vascular graft infection caused by aspergillus. Mycoses 2012;55:95-8.
2. Fuster RG, Clará A, Stefano SD, Legarra J. An unusual vascular graft infection by aspergillus: a case report and literature review. Angiology 1999;50:169-73.
3. Collazos J, Mayo J, Martínez E, Ibarra S. Prosthetic vascular graft infection due to Aspergillus species: case report and literature review. Eur J Clin Microbiol Infect Dis 2001;20:414-7.
4. Calcaterra D, Bashir M, Gailey MP. Ascending aortic graft thrombosis and diffuse embolization from early endoluminal aspergillus infection. Ann Thorac Surg 2012;94:1337-9.
5. Aguado JM, Valle R, Arjona R, Ferreres JC, Gutierrez JA. Aortic bypass graft infection due to aspergillus: report of a case and review. Clin Infect Dis 1992;14:916-21.
6. Zosimas D, Abukar A, Srilekha A. A rare case of peripheral vascular graft infection by aspergillus fumigatus and review of the literature. Ann R Coll Surg Engl 2017;99:e34-5.
7. Grothues F, Welte T, Grote HJ, Roessner A, Klein HU. Floating aortic thrombus in systemic aspergillosis and detection by transesophageal echocardiography. Crit Care Med 2002;30:2355-8.

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