Mycotic Intracranial Aneurysm Secondary to Left Ventricular Assist Device Infection

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Abstract

Background—Mycotic aneurysms are a complication of infective endocarditis. Infection of left ventricular assist devices (LVADs) may lead to bacteremia and fever causing complications similar to those seen in patients with prosthetic valve endocarditis. Intracranial mycotic aneurysms are rare, and their presence is signaled by the development of subarachnoid hemorrhage in the setting of bacteremia and aneurysms located distal to the circle of Willis.

Case Presentation—We present the case of a patient with a LVAD presenting with headache who is found to have an intracranial mycotic aneurysm through computed tomography angiography of the head. The patient was successfully treated with endovascular intervention.

Conclusion—In patients with LVADs, mycotic aneurysms have been reported, however not intracranially. To the best of our knowledge, this is the first intracranial mycotic aneurysm secondary to LVAD infection that was successfully treated with endovascular repair. Intracranial mycotic aneurysms associated with LVADs are a rare phenomenon. The diagnosis of mycotic aneurysms requires a high index of suspicion in patients who present with bacteremia with or without headache and other neurological symptoms.

Disclosure—None.

Keywords

Mycotic aneurysm; left ventricular assist device (LVAD); bacteremia

Background

Left ventricular assist devices (LVADs) are mechanical pumps used as bridge therapy to cardiac transplantation or as destination therapy in patients with refractory heart failure. LVADs have complications, most commonly infection, associated with implantation of the devices. We present the first case of an intracranial mycotic aneurysm in a patient with an LVAD that was successfully treated with endovascular embolization.

Case Report

A 55-year-old Hispanic male presented with a one-month history of worsening right hemicranial pulsatile headache. His past medical history was significant for coronary artery disease and congestive heart failure requiring LVAD placement five years prior. Four years after LVAD placement, he experienced a small ischemic stroke. Six months prior to admission, he had recurrent bacteremia and a small subarachnoid hemorrhage. Cerebral angiography at that time showed no evidence of aneurysm, and the patient was managed conservatively with a six-week course of antibiotics which was completed two weeks prior to admission. Upon arrival, the patient did not have any neurological complaints other than headaches and his physical examination was unremarkable. Electrocardiogram showed normal sinus rhythm, and chest radiograph showed LVAD in place with no acute chest abnormalities.
Computed tomography (CT) of the head without contrast showed an interval increase in the amount of supratentorial subarachnoid hemorrhage in the right temporal region when compared with previous CT scans. Given the patient's history of bacteremia and subarachnoid hemorrhage, a CT angiography of the head was performed and showed a 7.5 x 4.8 x 5.1-mm aneurysm arising from a cortical temporal branch of the right middle cerebral artery (Figure 1). The location was suggestive of a mycotic aneurysm.

Blood cultures were positive for Klebsiella rhinoscleromatis sensitive to Imipenem. All other cultures including urine and sputum were negative, and the patient did not have any other obvious source of infection. On day six of hospitalization, the patient developed left-hand weakness and a transient generalized seizure. Repeat CT and CT angiography of the head showed rebleeding and an increase in the size of the aneurysm to 10.5 x 9.1 x 6.9 mm (Figure 2). Considering the rebleeding and the increasing size of the aneurysm, the patient underwent endovascular onyx gel embolization of the right middle cerebral artery aneurysm (Figure 3).

**Discussion**

Mycotic aneurysm is a term used to refer to an aneurysm that exhibits inflammatory changes attributed to an infection. They are typically caused by bacterial or fungal infection with blood cultures positive in 46% of patients [1]. Mycotic aneurysms are a complication typically associated with infective endocarditis with a rate of 2%-4% although they are responsible for only 1% of all cerebrovascular complications [2]. In general, intracranial mycotic aneurysms are rare and account for 0.7%-6.5% of all intracranial aneurysms and are associated with high mortality [2]. Intracranial mycotic aneurysms can be identified by their location. They often occur in the more distal portions of the middle cerebral artery allowing them to be distinguished from berry aneurysms which are typically found at the base of the brain and the circle of Willis.

LVADs are being increasingly used in patients with severe refractory heart failure either as a bridge to heart transplantation or as destination therapy [3]. There are risks associated with the implantation of an LVAD, and up to 60% of patients develop an LVAD-related infection [4]. Bacteremia or fungemia can occur because of
chronic infections with biofilm formation of the driveline, pump pocket, and intravascular pump/cannula components. These infections are very difficult to treat, and the removal of the device is warranted [5]. These bloodstream infections, particularly in the presence of underlying infective endocarditis, may lead to the development of mycotic aneurysms and are seen in 18%–59% of patients [5]. In patients with LVADs, mycotic aneurysms have been reported in the aorta and left ventricle but there has only been one other case of intracranial mycotic aneurysm reported in a 64-year-old male about two years after LVAD placement [6]. However, in that patient, the lesion was too distal for endovascular repair; therefore, the patient did not undergo surgical intervention and eventually expired [6]. In comparison, our 55-year-old male patient was diagnosed with intracranial mycotic aneurysm about five years after LVAD placement and was successfully treated with endovascular intervention. Our patient had no other source of infection which could be appreciated; therefore, bacteremia and subsequently mycotic aneurysm formation were attributed to LVAD infection.

In conclusion, intracranial mycotic aneurysms associated with LVADs are a rare phenomenon. The diagnosis of mycotic aneurysms requires a high index of suspicion in patients who present with bacteremia with or without headache and other neurological symptoms.

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References