Bilateral common carotid artery mycotic aneurysms in the setting of intravenous drug abuse

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ABSTRACT

Carotid mycotic aneurysms are rare, and fewer than five case reports have described carotid mycotic aneurysms due to intravenous drug abuse. Rare bilateral intracranial mycotic carotid aneurysms have been reported, although a review of literature revealed no cases of bilateral extracranial carotid aneurysms. We have reported the case of a 41-year-old man who had presented with intermittent fevers, headaches, and myalgias of 2 weeks' duration. He was found to have bilateral carotid artery mycotic aneurysms after intravenous drug abuse with neck injections. We used a management strategy entailing unilateral endovascular balloon control with open surgical resection followed by placement of a saphenous vein graft. The contralateral aneurysm was managed nonoperatively with antibiotics. (J Vasc Surg Cases Innov Tech 2023;9:1-4.)

Keywords: Carotid artery; Mycotic aneurysm; Stroke

Extracranial carotid mycotic aneurysms are rare. The most common etiologies of carotid mycotic aneurysms are trauma, neighboring inflammation, and septic emboli.[1-3] Given the risk of rupture and thromboembolism, prompt treatment is necessary.[4]

The reference standard treatment of infected aneurysms is open surgical repair involving debridement with autogenous interposition or extra-anatomic bypass.[5] Other reported options include ligation, patch angioplasty, and endovascular techniques. No definitive consensus has been reached regarding the treatment of carotid mycotic aneurysms.[3] The patient provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

A 41-year-old man with hepatitis C and active intravenous (IV) drug abuse (IVDA) with multiple relapses over 7 years had presented with fevers of 2 weeks' duration. He had injected into his neck bilaterally during the previous 2 to 3 weeks; most recently 4 days prior. He had recovered from right-sided craniotomy and 6 weeks of IV antibiotics for an intracranial abscess in the setting of the neck injections 2 months previously. On admission, he had complained of neck pain, headaches, and generalized myalgia. On examination, he had induration over the bilateral neck, with progressive swelling of the right side. During the next several hours, the area had become larger, fluctuant, and pulsatile, raising concern for a mycotic carotid aneurysm with imminent rupture possible.

Computed tomography angiography (CTA) demonstrated abscesses involving both carotid arteries (Figs 1 and 2). A focal, eccentric 1.1-cm dilation of the right common carotid (CCA) was visualized. The left carotid artery had a more subtle, but multifocal, luminal irregularity and wall thickening, consistent with a mycotic pseudoaneurysm. Given the risk of rupture, the patient underwent surgical repair of the right side.

Under endovascular proximal balloon control of the CCA, the patient underwent ligation of the right external carotid artery with a right CCA to internal carotid artery (ICA) saphenous vein graft and coverage with a pectoralis flap. The use of a balloon occlusion test and possible ligation were considered. However, neuromonitoring was not immediately available, and an awake neurologic evaluation could not be safely performed and was not deemed a viable solution. Because of the rapid clinical progression, we decided to proceed with revascularization without neuromonitoring.

The presence of extensive inflammation meant that dissection for vessel control was extremely challenging. Endovascular control was obtained through femoral access to prevent uncontrollable hemorrhage. The patient underwent heparinization immediately after femoral access. Angiography of the right carotid artery demonstrated a distal CCA pseudoaneurysm and irregularity of the proximal CCA above the clavicle (Fig 3). A 6-mm filter device was deployed in the normal region of the distal ICA, and a 6-mm × 4-cm angioplasty balloon was placed across the carotid bifurcation and pseudoaneurysm.

Next, open control of the CCA at the base of the neck was obtained, followed by control of the ICA. These were clamped, and the endovascular balloon was left in place over the external carotid artery because the latter could not be safely dissected. The carotid bifurcation and surrounding tissue were resected. Shunting was not performed, because proximal control of the CCA was tenuous due to the infection extending to the clavicle. After

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Author conflict of interest: none.

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The editors and reviewers of this article have no relevant financial relationships to disclose per the Journal policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2468-4287

https://doi.org/10.1016/j.jvscit.2022.11.006

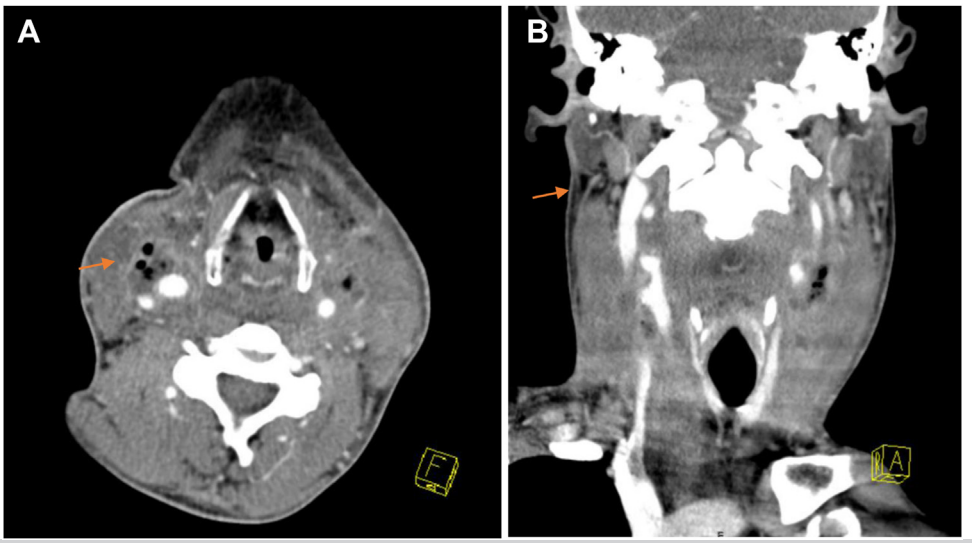

Fig 1. Representative axial **(A)** and coronal **(B)** computed tomography angiography (CTA) images of the head and neck demonstrating the right carotid abscess and pseudoaneurysm (*arrow*).

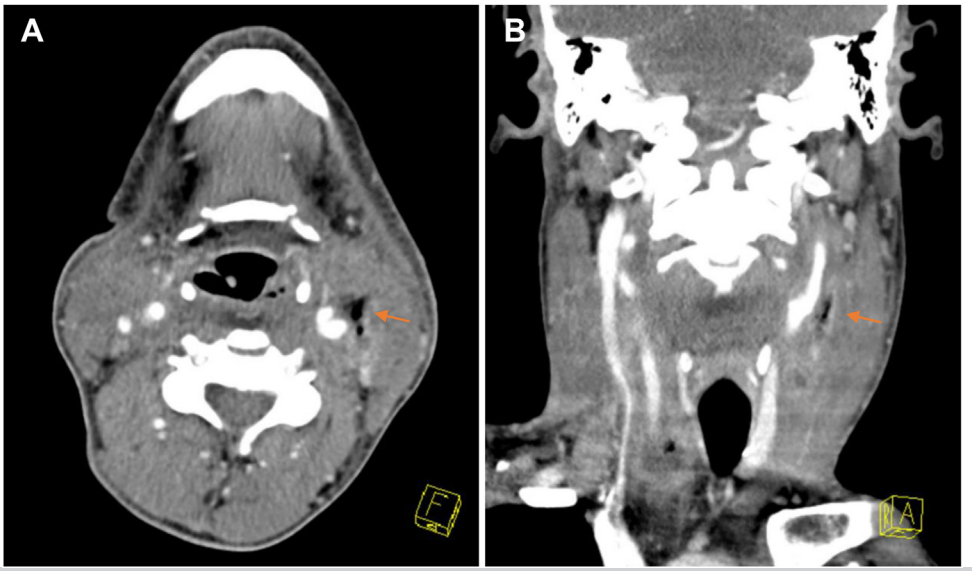

Fig 2. Representative axial **(A)** and coronal **(B)** computed tomography angiography (CTA) images of the head and neck demonstrating the left carotid abscess and pseudoaneurysm (*arrow*).

debridement, an interposition saphenous vein graft from the CCA to ICA was placed. The total clamp time was 105 minutes. Chronic scarring and inflammation throughout the surgical field meant the dissection and sewing of the graft were substantially more difficult. For vessel coverage, a pectoralis flap was used.

Immediately postoperatively, the patient had developed left-sided hemiparesis. CTA demonstrated patency of the vein graft but occlusion of the right middle carotid artery M1 segment. He was not a candidate for endovascular neuro-rescue, given the extensive carotid surgery. The blood and tissue cultures grew methicillin-resistant *Staphylococcus aureus* for which he was treated with IV antibiotics. Given the patient's critical condition, the remaining infection on the left was managed initially with antibiotics. In the absence of a postoperative stroke, intervention of the left carotid artery would have been considered within 48 to 72 hours, pending clinical progression.

CTA on postoperative day 5 demonstrated improvement of the abscess. Given the patient's clinical improvement, it was decided to treat the left nonoperatively with IV antibiotics. Carotid duplex ultrasound, performed on postoperative day 12, showed an intact bypass with improvement of the inflammation. CTA on postoperative day 17 revealed resolution of the right carotid abscess and an interval decrease in the size of the left carotid abscess. Repeat blood cultures demonstrated no growth before discharge.

The patient was discharged on postoperative day 24. Given the persistence of the left carotid inflammation, he continued antibiotic therapy for 3 months as an outpatient (2 months of IV

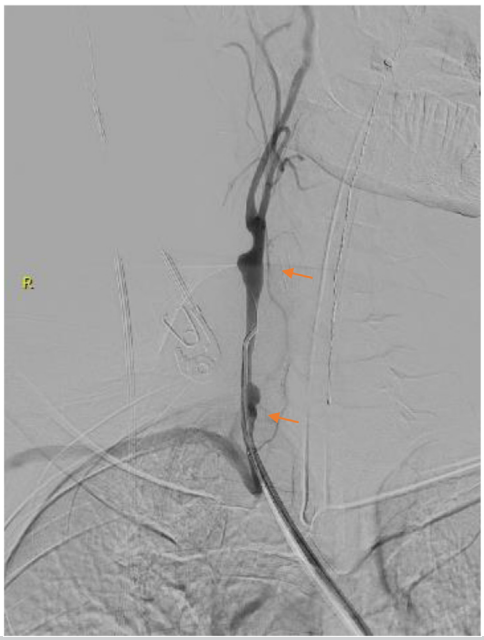

Fig 3. Angiography demonstrating luminal irregularity of the right common carotid artery just distal to the brachiocephalic bifurcation (*arrow*) and also distally below the carotid bifurcation (*arrow*).

vancomycin followed by 1 month of oral doxycycline). CTA at 3 months postoperatively showed resolution of both carotid abscesses. During outpatient follow-up at that time, he had had residual left arm weakness. Nevertheless, he had regained strength in his leg and was able to perform daily activities independently.

DISCUSSION

The first reported mycotic carotid aneurysm was in 1966.[6] A review of the literature between 1979 and 2022 revealed 193 mycotic aneurysms of the extracranial carotid artery.[7] Only five reported cases were secondary to IVDA. To the best of our knowledge, the present case is the first reported case of bilateral extracranial carotid artery mycotic aneurysms.

The most common clinical presentation of mycotic extracranial carotid aneurysms has been an expanding, pulsatile mass associated with fevers, bleeding, difficulty with speech or swallowing, and/or respiratory distress.[3,7,8] Both intra- and extracranial mycotic carotid aneurysms have been associated with dental infections, foreign bodies, endocarditis, and IVDA.[9,10] The common bacterial organisms have included *S. aureus* (most common), *Streptococcus*, *Salmonella*, *Aspergillus*, *Pseudomonas*, and *Bacteroides*.[3,7,11]

If left untreated, patients can develop complications such as rupture and septic embolization.[3,9,11] The different techniques used to restore anterograde flow have included ligation with primary reanastomosis, in situ bypass, and patch repair.[3,12] In contemporary practice, a hybrid of open and endovascular techniques have been used for proximal control before repair.[7,13] Endovascular stent grafting has demonstrated a high risk of delayed complications. Previous reports have described debridement of the infected tissue with reconstruction using autologous vessels, synthetic prostheses, and allografts.[3,10,11,14] However, the optimal approach remains unclear, given the rarity of this condition.[15]

Our patient had experienced a right middle cerebral artery stroke. The extended endovascular filter and clamping time without shunting had contributed to his postoperative stroke. Despite the use of a meticulous endovascular technique and embolic protection, the occurrence of septic debris embolization was likely. The patient's recent intracranial abscess associated with the neck injections made embolization a particular consideration. Although for our patient, neuromonitoring could not be performed, we would recommend its use in an optimal setting. Had neuromonitoring been available, we might have considered ligation. If signs of stroke had been present intraoperatively, the neurointerventional team could have evaluated the potential for endovascular rescue. Despite the stroke, he had recovered after receiving physical therapy. The present case has demonstrated the importance of prompt diagnosis and surgical correction.

The presence of bilateral abscesses poses a unique challenge regarding the surgical and postoperative management. Interestingly, our patient's contralateral carotid abscess was able to be managed nonoperatively. Although we would not advocate this as a primary approach, the success of our nonoperative management presents an alternative for high-risk patients. The conditions favoring nonoperative management include the absence of frank rupture and the presence of noncircumferential infection and limited aneurysmal dilation.

CONCLUSIONS

Mycotic aneurysms of the carotid arteries are rare, rapidly progressing, and lethal if not quickly diagnosed and managed. To the best of our knowledge, the present case is the first reported case of bilateral extracranial mycotic carotid aneurysms associated with IVDA. Endovascular control of the affected branches with open surgical debridement and grafting offers a viable solution. For cases with more limited infection, extended courses of IV antibiotics could lead to resolution.

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Submitted Aug 30, 2022; accepted Nov 9, 2022.