Embolization of an External Carotid Artery Mycotic Aneurysm

A case report on endovascular treatment of a mycotic aneurysm of the external carotid trunk before cardiac surgery.

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Pseudoaneurysms of the external carotid artery result from vessel wall disruption. Etiologies include trauma, iatrogenic injury, head and neck cancer, radiation therapy, and mycotic aneurysm formation. Mycotic aneurysms of the external carotid artery are rare and result from infectious destruction of the vessel wall. These lesions can cause a life-threatening hemorrhage and can be considered a variant of carotid blowout syndrome. We describe a case of an expanding mycotic aneurysm of the right external carotid artery trunk, which was successfully treated with coil embolization in the setting of endocarditis before cardiac valve replacement.

CASE REPORT

A 32-year-old right-handed man with a history of intravenous drug use was admitted to our hospital with mitral valve endocarditis. During his stay, the patient began to experience altered mental status and mild left hemiparesis. Brain magnetic resonance imaging revealed multiple small areas of restricted diffusion throughout multiple vascular territories consistent with septic emboli. In addition, areas of low signal with blooming were identified on gradient echo images, consistent with blood product deposition (Figure 1).

In preparation for mitral valve replacement, cerebral

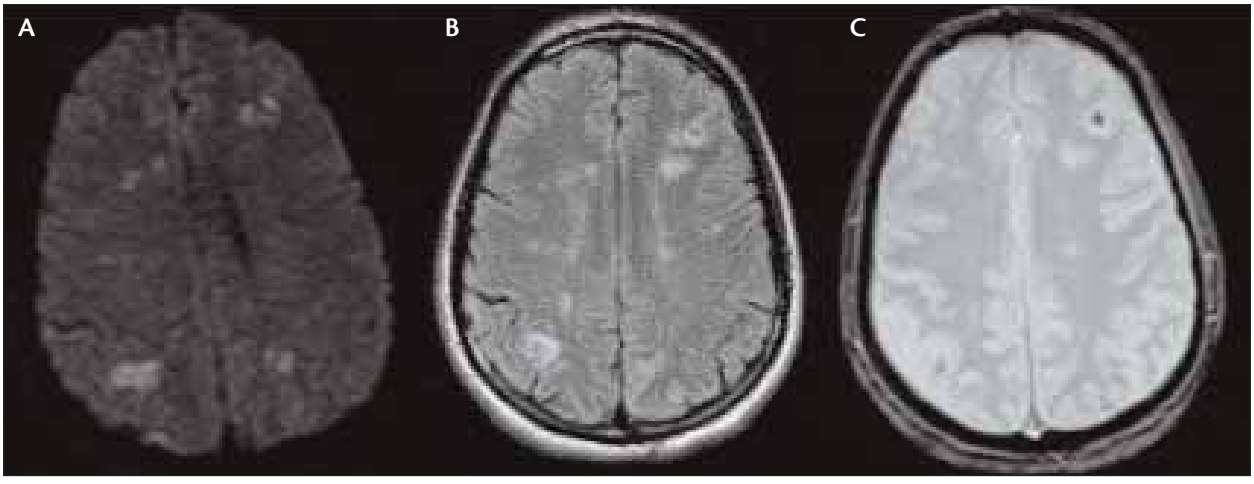

Figure 1. Diffusion weighted (A) and FLAIR (fluid-attenuated inversion recovery) (B) magnetic resonance images of the brain demonstrate scattered, peripheral, small foci of restricted diffusion and abnormal signal in multiple vascular territories consistent with septic emboli. Gradient echo images (C) show low signal with blooming artifact in these corresponding regions consistent with blood product deposition.

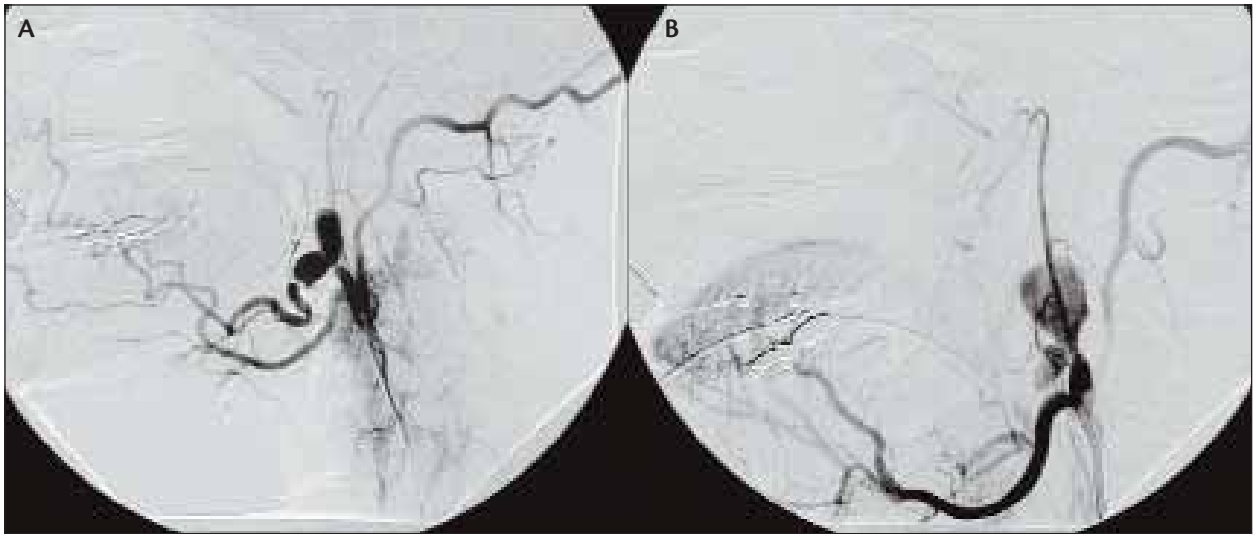

Figure 2. Initial (A) diagnostic angiogram of the external carotid artery demonstrates a bilobed mycotic aneurysm of the external carotid trunk, which incorporates the origin of the right facial artery. Subsequent angiogram 8 days later (B) demonstrated an increase in size of the mycotic aneurysm with decreased antegrade flow through the facial artery.

angiography was requested to assess the presence of intracranial mycotic aneurysms, which are a contraindication to placement of the patient onto cardiac bypass. The intracranial vessels were unremarkable on selective cerebral angiography. Injection of the right common carotid artery revealed a bilobed 10- X 6-mm aneurysm of the right external carotid artery trunk incorporating the right facial artery origin with delayed filling and interruption of the external carotid beyond the lesion (Figure 2A). The right lingual and occipital arteries filled normally. The distal right internal maxillary artery was reconstituted via ophthalmic and facial artery collaterals. No treatment was initiated because the patient still had positive blood cultures. In discussion with the various clinical services, endovascular treatment was recommended. Embolization would be initiated after the bacteremia was successfully treated, before mitral valve replacement, considering the risk of hemorrhage, particularly in the setting of cardiac bypass and anticoagulation.

Repeat intent-to-treat angiography 8 days later revealed significant enlargement and change in morphology of the aneurysm despite continuous antibiotic treatment (Figure 2B). No antegrade flow was identified beyond the origin of the aneurysmal sac, and severely delayed antegrade flow in the external carotid trunk was visualized in the right facial artery. Embolization was performed via a microcatheter (Prowler 14, Codman Neurovascular, Raynham, MA) positioned within the pseudoaneurysm sac (Figure 3). Two framing coils (Microplex-18 11 mm X 25 cm and 13 mm X 32 cm, MicroVention Terumo, Aliso Viejo, CA) were placed with preserved flow through the right ascending pharyngeal, occipital, and lingual arteries. A combination of 11 additional platinum and Hydrogel coils (MicroVention Terumo) was deployed within the sac with progressive obliteration, distal to proximal. Two additional Microplex-10 coils were deployed within the external carotid trunk to obliterate the entrance to the aneurysm.

Postembolization angiography demonstrated complete obliteration of the aneurysm with no antegrade flow in the right facial artery and with preservation of the right ascending pharyngeal, lingual, and occipital branches (Figure 4). The right facial artery territory was reconstituted via collaterals from the left external carotid artery. The patient underwent a successful mitral valve replacement and was discharged home 20 days after the embolization on anticoagulation with a peripherally inserted central catheter for long-term intravenous antibiotic therapy.

DISCUSSION

Pseudoaneurysms of the external carotid artery and its branches have been described in cases of trauma[1,2] or iatrogenic injury including transsphenoidal surgery,[3] tonsillectomy,[4] and dental extraction.[5] Pseudoaneurysms of the external carotid tree can also occur in patients with head and neck cancer, either primarily as a result of tumor infiltration of the vessel or secondarily as a result of radiation therapy.

Mycotic aneurysms may be true aneurysms involving all three layers of the vessel wall or pseudoaneurysms. The most important complication from mycotic aneurysms is hemorrhage due to rupture, which can occur despite adequate antibiotic therapy. Endovascular therapy has been performed for external carotid pseudoaneurysm forma-

Figure 3. Lateral road map image of the external carotid artery shows a microcatheter positioned within the aneurysm sac (arrow).

tion in order to prevent catastrophic hemorrhage from potential rupture or progressive expansion.

Our case demonstrates that rapid pseudoaneurysm growth can occur despite adequate antibiotic therapy, and that coil embolization is an effective, minimally invasive technique to definitively treat these lesions and prevent the complications of devastating hemorrhage. Because the coils are only contained by the surrounding soft tissues adjacent to the interrupted vessel, they are prone to migration. In contradistinction from endovascular treatment of true aneurysms, in which neck remnants may be present, it is important to seal the neck of pseudoaneurysms to prevent migration of coils and recanalization. This can be performed with liquid embolic material or, as in this case, with two small coils occluding the leading vascular trunk.

Because of rich collateral supply of the head and neck via the external carotid arteries, embolization of pseudoaneurysms in this location may require parent vessel occlusion without risk of ischemia or infarction to the tissues. This allowed for safe placement of the patient onto cardiac bypass for valve replacement, definitively treating his mitral valve endocarditis. ■

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Figure 4. Postangiographic image shows a coil mass with no residual filling of the aneurysm sac or the right facial artery. Flow through the right lingual, ascending pharyngeal, and occipital arteries was preserved. The right facial artery was reconstituted via collateral flow from the contralateral side (not shown).

1. Nicoucar K, Popova N, Becker M, et al. Pseudoaneurysm of the external carotid artery after a blunt facial trauma. J Trauma. 2008;65:E24-27.
2. Cox MW, Whittaker DR, Martinez C, et al. Traumatic pseudoaneurysms of the head and neck: early endovascular intervention. J Vasc Surg. 2007;46:1227-1233.
3. Cockroft KM, Carew JF, Trost D, et al. Delayed epistaxis resulting from external carotid artery injury requiring embolization: a rare complication of transsphenoidal surgery: case report. Neurosurgery. 2000;47:236-239.
4. Karas DE, Sawin RS, Sie KC. Pseudoaneursym of the external carotid artery after tonsillectomy. A rare complication. Arch Otolaryngol Head Neck Surg. 1997;123:345-347.
5. Marco de Lucas E, GutiOrrez A, Gonz3lez Mandly A, et al. Life-threatening pseudoaneurysm of the facial artery after dental extraction: successful treatment with emergent endovascular embolization. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008;106:129-132.