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Endovascular Treatment of Epistaxis in a Patient with Tuberculosis and a Giant Petrous Carotid Pseudoaneurysm

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Summary: A 31-year-old man with pulmonary tuberculosis who did not have human immunodeficiency virus had massive epistaxis from a giant petrous internal carotid artery pseudoaneurysm. Endovascular trapping of the aneurysm was performed, curing the epistaxis. MR showed multiple enhancing brain lesions that resolved with additional antituberculous drug therapy.

Index terms: Tuberculosis; Epistaxis; Aneurysm; Interventional neuroradiology

With the rising prevalence of tuberculosis and the appearance of drug-resistant strains, radiologists should be alerted to an abnormality reminiscent of a bygone era. The prevalence of carotid pseudoaneurysms caused by infections declined dramatically after the institution of antibiotic therapy in the 1940s (1), and these aneurysms are now rare. Even more unusual are ruptured pseudoaneurysms of the petrous portion of the internal carotid artery, with only 10 cases reported in a 1991 review of the subject (2). We present a case of ruptured pseudoaneurysm of the petrous portion of the carotid artery that was believed to be associated with systemic tuberculosis and discuss treatment by endovascular trapping.

Case Report

A 31-year-old man had a 2-month history of severe headaches, fever, chills, night sweats, lethargy, anorexia, and 18-kg weight loss. Chest radiographs showed bilateral miliary opacities. Bronchoscopic biopsies grew *Mycobacterium tuberculosis,* and treatment was begun with isoniazid, rifampin, and pyrazinamide. Headaches and cranial neuropathies developed 1 month later, and 2 months after presentation he was found at home unconscious with profuse bleeding from the left nostril. He was initially taken to a community hospital, where his hematocrit fell from 29.7% on admission to 7.9% after further epistaxis. He was stabilized by transfusion and placement of anterior and posterior nasal balloons and packing that controlled the epistaxis. A cerebral angiogram showed a giant psuedoaneurysm of the petrous segment of the left internal carotid artery that projected into the sphenoidal sinus (Fig 1A). Cranial magnetic resonance (MR) imaging showed multiple contrast-enhancing cerebral, cerebellar, and brainstem lesions and opacification of the left sphenoidal sinus (Fig 1D). The patient was transferred to this institution for further care.

Before definitive intervention, a temporary balloon occlusion test of the left internal carotid artery was performed to assess the adequacy of collateral circulation. During 45 minutes of temporary occlusion under systemic anticoagulation, the neurologic examination was unchanged. Technetium-99m hexamethylpropyleneamine oxime was injected intravenously during balloon occlusion, and cerebral perfusion was normal on subsequent single-photon emission computed tomography of the brain (3). Embolization was performed the next day (Fig 1B and C).

With a 7F balloon occlusion catheter (Meditech, Boston, Mass) occluding flow in the left internal carotid artery and with systemic anticoagulation, a Tracker-18 microcatheter (Target Therapeutics, Fremont, Calif) was passed through the central lumen of the balloon catheter into the cervical internal carotid artery. Using road-mapping to identify the positions of the aneurysm and arterial lumen, the tip of the Tracker catheter was carefully guided by an angled-tip Glidewire Gold microwire (Meditech) beyond the pseudoaneurysm into the cavernous segment of the artery. Platinum microcoils (occlusion coils, Target Therapeutics; and Hilal coils, Cook, Bloomington, Ind) were introduced to occlude the cavernous portion of the carotid artery distal to the aneurysm and the petrous portion in the vicinity of the aneurysm. After this, the initial catheters were exchanged for a 7.3F Hieshima guiding catheter (Cook), and a Goldvalve #9 balloon (Ingenor, Paris, France) was introduced on a Tracker-18 catheter, inflated with contrast material, and detached in the cervical portion

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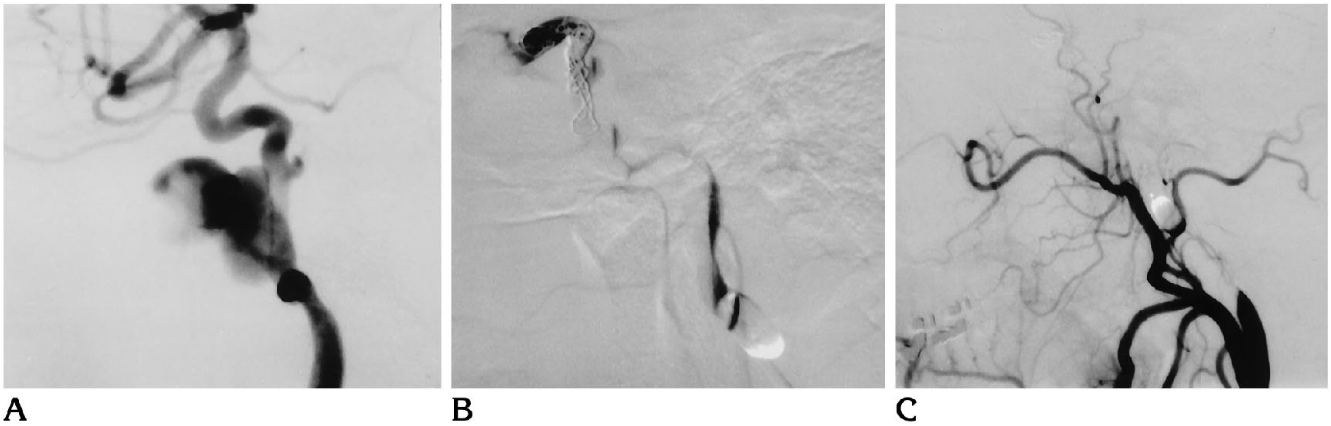

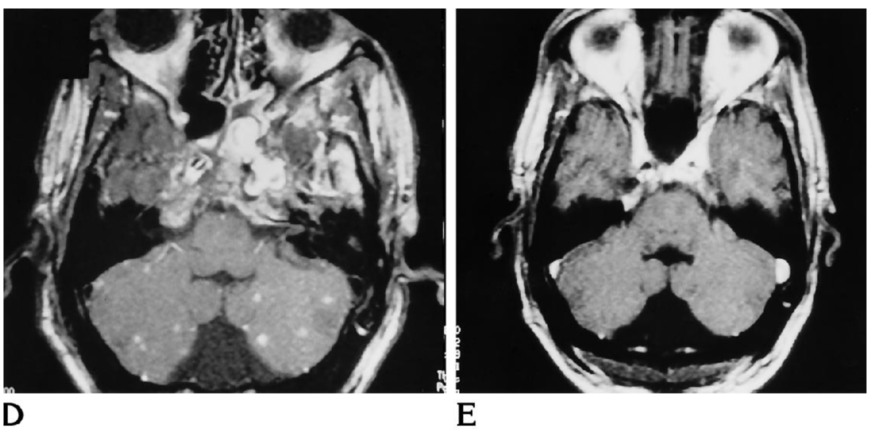

Fig 1. *A*, Lateral view of the initial left internal carotid angiogram shows a giant pseudoaneurysm of the petrous segment of the artery. A smaller precavernous aneurysm is noted distal to the giant aneurysm.

B, Lateral view of the left internal carotid artery as occlusion microcoils are being deposited in the cavernous and petrous segments distal to the giant aneurysm. The microcatheter has been passed through the central lumen of a temporary balloon occlusion catheter that provides flow arrest from the balloon, which has been positioned in the cervical segment of the artery.

C, Lateral view of the left common carotid artery injection during placement of a detachable balloon in the cervical segment of the artery. The balloon was detached to occlude the artery proximal to the aneurysm after microcoils were confirmed to be occlusive distal to the aneurysm.

D, Axial postcontrast T1-weighted MR image (700/22 [repetition time/echo time]) of the brain at the time of presentation with epistaxis. The aneurysm projects into the sphenoidal sinus, and there are multiple enhancing nodular lesions of the brain. There is opacification of the left side of the sphenoidal sinus.

E, Axial postcontrast T1-weighted MR image (800/22) of the brain after additional antituberculous and antibiotic therapy. The contrast-enhancing brain lesions have disappeared, and the aneurysm has become smaller, likely because of clotting and retraction. The sphenoidal sinus has cleared.

of the internal carotid artery proximal to the aneurysm. There were no complications from the procedure.

The next day, the nasal balloons were removed. There was no further epistaxis. The original bronchoscopic cultures showed the strain of *Mycobacterium* to be sensitive to the three prescribed drugs, and the antituberculous therapy was continued. The patient was given a course of oral antibiotics (amoxicillin and clavulanate potassium) at the time of hospital discharge for possible sphenoidal sinusitis. A cranial MR study 2 months after embolization showed resolution of the contrast-enhancing brain lesions (Fig 1E), and on follow-up clinical examination the patient was neurologically normal.

Discussion

Tuberculosis is known to cause aneurysms (4, 5). Though in this case tissue from the aneurysm was not obtained for histologic analysis and culture, it is reasonable to assume that in this otherwise healthy young man the miliary disease of the lung, the miliary disease of the brain, and the pseudoaneurysm of the carotid artery were related. The diagnosis of pulmonary disease was firmly established, and the response of the brain lesions to continued antituberculous therapy supports tuberculosis as the cause of the central nervous system disease. The sphenoidal sinus opacification was most likely a result of the rupture of the aneurysm into the sinus or subsequent nasal packing. Carotid pseudoaneurysms caused by infection carry a high risk of rupture, and the mortality of rupture can be 54% (1, 6). The clinical presentation of epistaxis or otorrhagia with neurologic deficits has been described as unique to petrous carotid aneurysm rupture, and these lesions have been managed surgically or by proximal endovascular occlusion of the internal carotid artery (1, 7). There is evidence that distal occlusion of the internal carotid artery might be associated with fewer embolic events than is proximal occlusion (8). In this case, the internal carotid artery was occluded both distal and proximal to the aneurysm. Microcoils were chosen as the distal embolic agent in the belief that a guide wire–directed microcatheter could be more precisely, successfully, and safely guided beyond the pseudoaneurysm than could a detachable balloon catheter. In addition, microcoil occlusion of an artery can be performed easily while the artery is under flow arrest to prevent distal migration of embolic material while effecting permanent occlusion.

Because the prevalence of infectious pseudoaneurysms might be on the rise (9), it is important to consider the diagnosis of ruptured pseudoaneurysm in infected or immunocompromised patients who have massive bleeding and to be familiar with endovascular techniques that can be life saving in such circumstances.

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