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Imaging, and Digital Subtraction  
Angiography**

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## Case Report

# Bilateral Internal Carotid Aneurysms Presenting as a Nonpulsatile Parapharyngeal Mass: Complementary Diagnosis by CT, MR Imaging, and Digital Subtraction Angiography

Alberto Muñoz, Jorge Campollo, and Joaquín Vergas

**Summary:** We report fusiform aneurysms in both internal carotid arteries in a 74-year-old man who presented with a nonpulsatile retropharyngeal mass. Both helical CT and MR imaging disclosed the nature of the lesions. Arteriography, required for therapeutic decisions, confirmed the diagnosis. Because of the rarity of this condition and the potential for misdiagnosis, we describe the findings on complementary radiologic examinations.

Bilateral extracranial internal carotid artery (EICA) aneurysms are an exceedingly rare cause of bilateral neck masses. They usually are of the atherosclerotic origin and have a fusiform appearance (1–3). We present a case of a 74-year-old man who had difficulty swallowing, in whom we discovered a nonpulsatile, bilateral retropharyngeal mass. Helical CT and MR imaging were used to examine this patient, allowing this abnormality to be distinguished from other, more common neoplastic or inflammatory lesions.

### Case Report

A 74-year-old man presented to our otolaryngology service with progressive difficulty in swallowing and a sensation of a foreign body in the throat for a few months. His medical history was not contributory except for heavy smoking and moderate alcohol consumption.

On examination, the patient was thin, and he had a pulse of 87 and normal blood pressure. No adenopathy was present. Throat examination revealed remarkable bulging of the left wall of the oropharynx, which pushed the tonsils medially. There was questionable extension to the right side. No pulsations or thrills were palpable. The remaining otolaryngologic examination was negative. Routine blood investigation was within normal limits. A helical CT scan (Fig 1) showed bilateral vascular masses extending from the carotid space. The left-sided mass showed faint peripheral calcification. Dynamic intravenous iodine contrast administration revealed intraarterial

vascular enhancement in both lesions, consistent with bilateral aneurysms. The CT study also showed another aneurysm, in the intracervical portion of the left vertebral artery. On MR images (Fig 2), the masses showed concentric layers that had different signal characteristics on the routine pulse sequences. MR time-of-flight (TOF) angiography, with maximum intensity projection (MIP) after processing, revealed bilateral EICA and left vertebral fusiform aneurysms. Conventional intraarterial angiography (Fig 3) showed bilateral, fusiform EICA aneurysms. After balancing different therapeutic options, including stenting and surgery, we placed the patient on antiplatelet medication and managed him conservatively.

### Discussion

Extracranial aneurysms of the internal carotid artery are rare but well documented arterial lesions (4, 5). They have been classified into five distinct clinical types: pseudoaneurysms, and fusiform, saccular, spontaneous dissecting, or mycotic aneurysms (6). Fusiform aneurysms are the most common and usually are secondary to atherosclerosis. They typically are unilateral, situated more inferiorly along the EICA than are the other types, and, in 15% of cases, are associated with additional aneurysms elsewhere in the body (4–9). Symptoms include transient neurologic deficits and stroke, which may vary by the location and size of the aneurysm. Small cervical aneurysms of the EICA may be asymptomatic. Larger aneurysms may present as a palpable mass in the cervical region near the angle of the jaw or internally as a pharyngeal or tonsillar mass, they may or may not be pulsatile (4), and they can rupture (4–6).

Bilateral EICA aneurysms presenting as a mass in the oropharynx are exceedingly rare and can be mistaken for inflammatory or neoplastic lesions of the tonsils or parapharyngeal region, with disastrous consequences (5). They usually are fusiform, are of atherosclerotic origin, and are located at the level of carotid bifurcation (10, 11), except in post-traumatic (usually nonpenetrating) cases, in which the atlantoaxial level typically is the place of injury (2).

Although the diagnosis can be suspected when a pulsatile mass is found on physical examination, this sign often is absent (6, 9); therefore radiologic evaluation is necessary. Cross-sectional imaging techniques such as CT and MR currently are used

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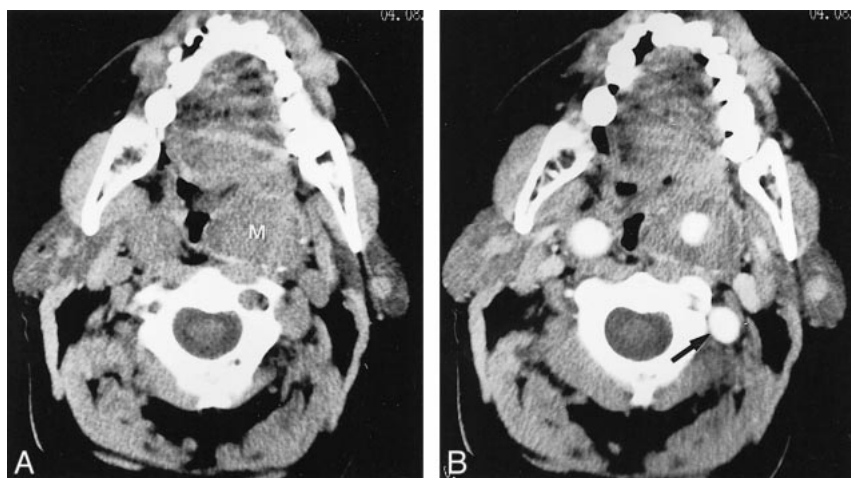


FIG 1. Axial helical CT images without (A) and with (B) intravenous contrast material at the level of the oropharynx.

A, Note a well-defined isodense left mass (M), in the parapharyngeal space, with eggshell calcification abutting the oropharyngeal lumen. Another mass is also seen on the right side.

B, Central round vascular enhancement is seen in the arterial phase of contrast administration, consistent with the patent lumen of the aneurysm. There is also aneurysmal dilation of the right internal carotid artery and tortuosity and aneurysmal dilation of the left vertebral artery (arrow).

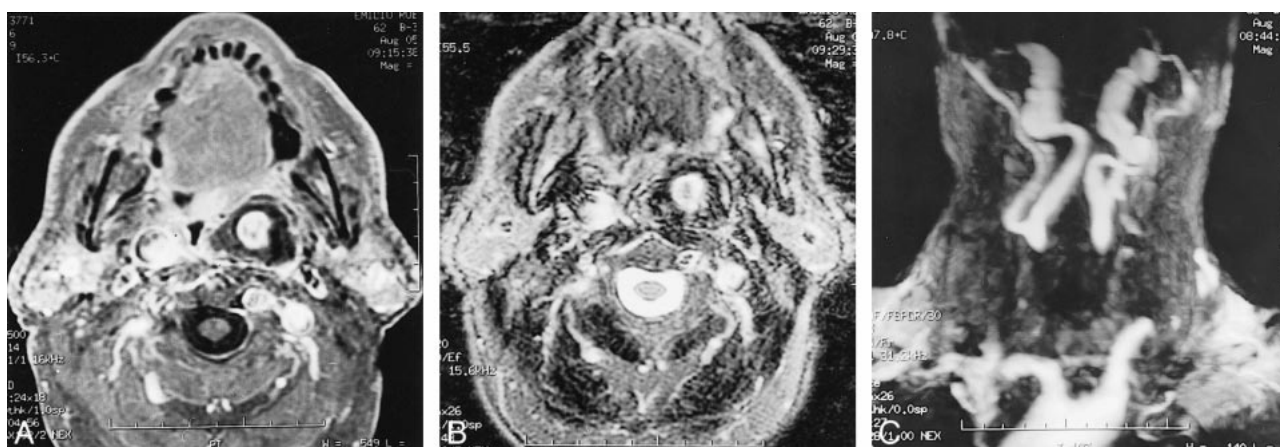


FIG 2. Axial MR images.

A and B, Axial T1-weighted (500/14 [TR/TE]), postcontrast fat-suppressed image (A), and T2-weighted fast spin-echo (4500/100) fat-suppressed image (B), at the same level. Notice lumen dilation with hyperintensity of both EICAs. The left is surrounded by a thick, low-signal rim, representing thrombus along the arterial wall.

C, MIP from TOF sequence source of images on coronal plane. Notice tortuosity of both EICAs above the carotid bifurcation with further fusiform aneurysmal dilation. Notice similar changes on the left vertebral artery. (Proximal portion of the common carotid artery is not seen because of the thickness of slice selected for MIP.)

to detect most morphologic lesions in the head and neck. These methods not only distinguish vascular lesions from tumors but also differentiate ectatic or kinked carotid arteries from their dangerous, aneurysmal counterparts (12, 13).

On CT scan, EICA aneurysms, particularly the fusiform type, may have peripheral eggshell calcification and exhibit arterial enhancement after intravenous administration of iodinated contrast material. This may be better appreciated on helical CT acquisition, because the acquisition can be performed in the arterial phase. In our case, the left internal carotid artery exhibited a large, fusiform, partially thrombosed aneurysm at the level of the oropharynx, which had a maximum external diameter of 33 mm and a true luminal diameter of 11 mm. On the right, the maximum diameter was 18 mm with a true luminal diameter of 13 mm. Additional tortuosity and aneurysmal dilation seen in the left vertebral artery further supports our belief that atherosclerosis was the probable cause of

the arterial changes in this patient. We could not exclude a posttraumatic etiology, however, despite the lack of a history of trauma. Minor trauma is known to be a putative factor in carotid- and vertebral-artery dissection in otherwise histologically normal arterial walls (14). In addition, up to 20% of patients with dissection have multiple dissections (15). Chronic arterial dissection can, in turn, cause formation of head and neck aneurysms and pseudoaneurysms.

There are few MR reports of this type of aneurysm. MR imaging of flow is complex, depending on factors such as velocity of flow, direction of flow, and parameters of MR acquisition (16, 17). In our case, the aneurysm had a high central signal intensity surrounded by a thick band of low signal intensity on axial conventional sequences, consistent with thrombus. The high intensity of the central signal corresponded to the patent residual arterial lumen, seen in both baseline and enhanced T1-weighted spin-echo sequences and in the T2-

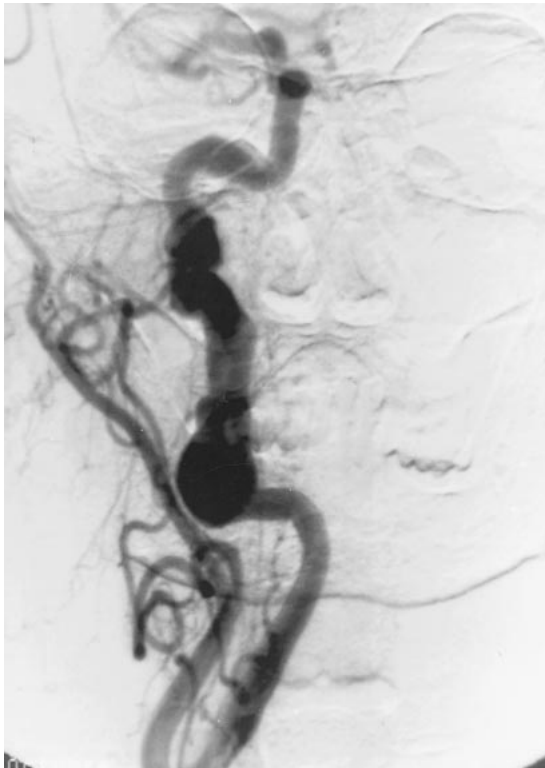


FIG 3. Digital subtraction angiography. Selective injection of the right common carotid artery (anteroposterior view), in the early arterial phase, shows tortuosity and fusiform aneurysmal dilation of the right EICA.

weighted fast spin-echo sequence, which represented flow within the aneurysm. Coronal MIP display of neck vessels taken from the TOF vascular study showed fusiform aneurysms dilating both EICAs at the level of the nasopharynx; kinking of both vessels suggested atherosclerotic changes. This display also showed the superior and inferior limits of the aneurysms. The axial sources of the images were essential in assessment of the true extent of the aneurysms, the thrombus, and the residual lumen.

Conventional intraarterial angiography is necessary to confirm anatomic boundaries in complex or difficult cases, such as in our patient, especially before proposed surgical or endovascular therapy. Classic angiographic signs of EICA aneurysms have been described by Margolis et al (18). Two angiographic features help differentiate the saccular from the fusiform aneurysm: saccular aneurysms show an outpouching off the arterial lumen, usually with a neck, whereas the fusiform type, as in our case, shows frank dilation of the arterial lumen with no additional contrast outside the lumen. This latter type of aneurysm usually is accompanied by distortion of the arterial lumen and dilation or stenosis in other segments of the vessel (18). In our case, both EICAs appeared similar on conventional angiography, which evaluated the extent of the aneurysmal lumen and some hemodynamic charac-

teristics of carotid and cerebral blood flow. Conventional angiography clearly underestimated the extent of the thrombosed wall of the aneurysm and its relation with other structures, however.

Our case includes three unusual features: 1) the unusually large size of one aneurysm and the thick thrombus, which suggest a longstanding process; 2) the location of the aneurysms (above the carotid bifurcation), in that fusiform aneurysms of the EICA usually are located at the level of the carotid bifurcation and those of the common internal carotid arteries usually are saccular and show a greater propensity for rupture (6, 11); and 3) the additional intracervical vertebral aneurysm, which would support atherosclerosis as the common cause of these processes (19) in a patient who otherwise lacked symptoms of an atherosclerotic condition.

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