Aneurysm of the internal carotid artery proximal to the carotid canal has been well described in the general surgical literature, and otolaryngologists have recognized and respected the lesion in the differential diagnosis of pharyngeal tumors and hematomas. Isolated reports of this aneurysm and its complications have appeared in the neurological and neurosurgical literature, and resection of the diseased segment of artery has been carried out with varying degrees of success. No previous reports of bilateral aneurysms of the extracranial internal carotid artery have been found.

Case Report

A 32-year-old right-handed man was referred to the North Carolina Baptist Hospital on January 23, 1963, with a chief complaint of right-sided weakness. One week before admission he had experienced a sudden onset of right-sided hemiparesis, hemihypesthesia, and right homonymous hemianopsia; these symptoms developed one hour after he awoke and were accompanied by a pronounced dysphasia. The patient was placed in a local hospital and given general supportive care. Within a few days the dysphasia improved, sensory examination reverted to normal, visual fields were again full, and the patient regained use of his right extremities.

Past history. Ten years prior to admission the patient had first noted a pulsatile mass in the left side of the neck below the mandible. He was unable to relate the initial appearance of the mass to trauma and he denied any previous severe cervical or faciatal infection. He was certain that the mass had not enlarged in the 10 years during which he had been aware of it, nor had it been painful or tender.

One year before admission the patient had experienced a transient right hemiparesis from which he recovered within 3 days. Because of this episode, anticoagulant therapy had been initiated and maintained until it was discontinued after the onset of the present illness.

General physical examination. Blood pressure was 114/70 mm. Hg bilaterally. A mass 3 cm. in diameter was observed below the angle of the left side of the mandible. The mass was firm and slightly movable within the deep cervical fascia. It was not tender; intrinsic pulsations synchronous with the heart beat were felt. No bruit was heard over the mass and the common carotid artery was palpated as a normal structure. The superficial temporal arteries were equally pulsatile. The fauces and the remainder of the general physical examination were normal. No mass was felt in the right side of the neck.

Neurological examination. The patient was alert and well-oriented with a very mild expressive dysphasia. Other than a slight weakness of the lower right side of the face, examination of the cranial nerves, including the optic fundi and visual fields, was normal. Deep tendon reflexes were increased in the right extremities. Hoffman’s sign was present only on the right side and Babinski’s sign was negative. The superficial abdominal and cremasteric reflexes were absent on the right. Pronounced weakness of the right arm was detected, especially involving the distal musculature, and there was minimal paresis of the right leg. A positive Barre’s sign was elicited in the right arm and right leg. Superficial and deep pain were normally perceived bilaterally; light touch, position and vibratory sensation were normal. Simultaneous sensory testing of both sides of the body revealed neglect of the right side to stimulation with light touch on the face, arm, and leg.

Laboratory studies. Serologic test for syphilis, routine examination of the blood and urine, electrocardiogram, and roentgenogram of the chest were negative. Roentgenograms of the cervical spine (Fig. 1) showed bilateral calcified masses on the soft tissues of the neck below the mandible. The spine was normal.

Left percutaneous serial carotid arteriography was performed and disclosed a fusiform aneurysm of the internal carotid artery with incomplete intraluminal filling (Fig. 2).

Right carotid arteriography was then carried out and a similar but smaller aneurysm of the right internal carotid artery was seen (Fig. 3). Its presence had been suspected after review of the plain films.

Operation. The left carotid system was explored under local anesthesia. After the common carotid artery was isolated, the dissection was carried cephalad. The external carotid artery was found on the medial surface of the aneurysm and the internal jugular vein over the anterior surface. Dense adhesions between these structures and the aneurysm were divided and the vessels were retracted. Aneurysmal dilatation of the internal carotid artery began proximally just past its origin (Fig. 4). The dissection was carried distally to the angle of the mandible and by palpation to the base of the skull, but a normal vessel was not encountered. The vagus nerve, densely adherent to the medial surface of the mass, was divided during the meticulous dissection.
Eben Alexander, Jr., S. M. Wigser and Courtland H. Davis

and an end-to-end suture performed. The aneurysm pulsed freely but anterior pulsation was limited by a laminated clot. The internal carotid artery proximal to the aneurysm was occluded for 15 minutes with no adverse effect on the awake patient, but no permanent occlusion was effected.

The postoperative course was uneventful except for hoarseness of the voice. The preoperative right hemiparesis continued to improve.

Comment. Even if resection of this aneurysm could have been accomplished by disarticulation or splitting of the mandible, the presence of a similar lesion of the right internal carotid artery and the improving neurological status of the patient precluded more radical therapy at this time. The transient neurological symptoms of the patient, with rapid abatement of a severe hemiparesis, suggested an embolic etiology, with discharge of particles of intramural laminated clot into the circulation. Absence of swelling over the aneurysm of the right internal carotid artery was explained by the dense fascial envelopment of the carotid sheath about the aneurysm; this has been noted in previous reports.

Review and Analysis of the Literature

Diagnosis. We found 155 cases of aneurysm of the extracranial internal carotid artery in the

Fig. 1. Anteroposterior and lateral roentgenograms of the cervical spine. Aneurysmal calcification is prominent below the left side of the mandible and is faintly seen on the right.

Fig. 2. Anteroposterior and lateral views of left carotid arteriogram showing an aneurysm of the extracranial internal carotid artery with intraluminal filling defects.
Bilateral Extracranial Carotid Aneurysms

Fig. 3. Anteroposterior and lateral views of right internal carotid arteriogram showing the superior pole of the aneurysm just beneath the base of the skull.

literature.\(^1\)\(^{1-6,9,13-20,25,26,30,32-36,38,40,41}\) Well-illustrated cases are few. Invariably the extracranial aneurysm of the internal carotid artery was found to arise at the bifurcation. Fig. 5 is an artist's depiction of all adequately reported types of aneurysms of the extracranial internal carotid artery.

Well-documented neurological deficit secondary to cerebral ischemia is described in only 8 of the 155 cases.\(^2\)\(^,3\)\(^,16\)\(^,18\)\(^,39\)\(^,40\) In the vast majority of reports the neurological status is not mentioned. In the older literature the presenting symptom of a patient with an aneurysm of the cervical internal carotid artery was usually a tender expanding mass in the neck or posterior fauces. Dysphagia secondary to the lesion itself, or secondary to compression of the nerve supply of the pharynx, was a frequent symptom. There are reports of aneurysms in this region being mistaken for tonsillar abscess; they have been incised with catastrophic results.\(^17\)\(^,33\)\(^,42\) Bleeding from the ear, or epistaxis not otherwise explained, has often alerted otoc-
Eben Alexander, Jr., S. M. Wigser and Courtland H. Davis

Fig. 5. Artist’s depiction of aneurysms of the extracranial internal carotid artery compiled from reported cases: (a) Beall’s case 4; (b) Beall’s case 5; (c) Boatman; (d) Bross; (e) Campiche; (f) Dimitza’s case 1; (g) Halasz; (h) Hardin; (i) Silcox; (j) present case, right; (k) present case, left.

laryngologists to the presence of this lesion. Headache has been an occasional complaint of these patients. Tortuosity simulating aneurysm of the common and of the internal carotid arteries has long been recognized. These lesions may also produce cerebral ischemic episodes and infarction. Tumors of the carotid body have also been mistaken for aneurysms and must be considered in the differential diagnosis.

Etiology. The etiology of the case reported in this paper must be considered to be congenital. Various other causes have been reported. Aneurysms caused by both blunt and penetrating trauma and spontaneous and traumatic dissecting aneurysms have been discussed. Local inflammation of the arterial wall by contiguous infection of the pharynx and petrous bone has been implicated as a source of aneurysmal dilatation of the internal carotid artery. Intrinsic syphilitic involvement of the arterial wall has been documented. Small arteriosclerotic aneurysms immediately distal to the carotid bulb of the extracranial internal carotid artery are found in elderly patients. Spontaneous saccular aneurysm, secondary to congenital medial defects arising at the arterial bifurcation of the common carotid artery, has not been reported.

Treatment. Sir Astley Cooper ligated the common carotid artery with a successful result in 1808. The patient died of “cerebral apoplexy” 13 years later and autopsy revealed no evidence of recurrence of a large aneurysm of the cervical internal carotid artery. Most patients were treated conservatively even after this report, but their natural history was stated best by Winslow who found that ligation reduced mortality from 71 to 30 per cent; he made a plea for more vigorous surgical therapy.

In recent years, confusion in the differential diagnosis of a pulsating cervical mass has been cleared by arteriography. Resection of the aneurysmal portion of the internal carotid artery has been followed by end-to-end anastomosis, anastomosis of the external to the distal internal carotid artery, and repair with autogenous vein and plastic prosthesis. Hypothermia, internal and external shunts, and a better...
understanding of cerebrovascular dynamics,\textsuperscript{8,11,16:32,58-57,37} all contribute to increased safety in performing an adequate resection.

**Discussion**

Excision of an extracranial aneurysm of the carotid artery is well within the realm of present-day surgical therapy, but treatment of this aneurysm requires a preoperative evaluation of the cerebrovascular supply. Arteriography obviates confusion in differential diagnosis and helps to demonstrate the anatomic boundaries of the aneurysm. The limiting factor in successful surgical approach is the distal continuation of the aneurysm into the base of the skull. Cerebral ischemia and infarction must be avoided by maintenance of adequate circulation.

Despite the relative infrequency of this aneurysm compared with those arising at other sites, 155 cases have been collected from the literature. It is interesting that only a small number of these patients were reported to have a neurological deficit, but more attention to a history of transient cerebral ischemia may reveal this complication to be more frequent.

The presence of bilateral lesions in our case is unusual and influenced the surgical approach. The strength of the deep cervical fascia is well demonstrated in this patient, since the aneurysm of the right internal carotid artery was not palpable on careful physical examination by several observers. An understanding of cervical fascial anatomy explains the presentation of this aneurysm as a faucial mass in many patients.

**Summary**

We have reported the unusual case of a patient with bilateral aneurysms of the extracranial internal carotid artery of apparent congenital origin. The patient had suffered a previous cerebrovascular ischemic lesion, apparently embolic. Although only a small number of previous reports of unilateral aneurysm of the extracranial carotid artery have shown neurological changes, those documented did seem to have the common feature of ischemic cerebrovascular lesions. These are probably related to embolic phenomena secondary to the escape into the carotid artery of intraluminal fragments from the large laminated clots commonly seen in these aneurysms.

A detailed artist's drawing of all previously adequately described aneurysms of the extracranial internal carotid artery has been included.

**References**


43. Young, N. Bleeding from the ear as a sign of leaking aneurysm of the extracranial portion of the internal carotid artery. J. Lnr. Otol., 1941, 60:35-64.