

Extracranial internal carotid artery stenosis associated with internal carotid artery aneurysm: a rare case in the literature

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ABSTRACT

Although extracranial internal carotid artery aneurysms are rare, they may cause life-threatening complications. Typically, a pulsatile mass in the neck can be detected on physical examination; however, some cases may be asymptomatic and further investigations may be required. A 62-year-old male patient was admitted with complaints of head and neck pain and obscuration of vision with a history of peripheral arterial disease. Carotid angiography showed stenosis of the internal carotid artery and aneurysm of the internal carotid artery at the beginning of the carotid bulb. The patient was operated under general anesthesia. Following aneurysmectomy and endarterectomy, the artery was successfully closed with saphenous vein patch plasty.

Keywords: Aneurysm; internal carotid artery; stenosis.

Extracranial carotid artery aneurysms are rare vascular lesions. The most common causes include atherosclerosis, fibromuscular dysplasia, and trauma.^[1] In addition, neck trauma, carotid dissection, previous carotid endarterectomy surgery, and infections including tonsillitis and peritonsillar abscess play a role in the etiology.^[1] Marfan's syndrome, Behçet's syndrome, and Takayasu's arteritis are among the other rare causes.^[1] Furthermore, rupture of aneurysm carries an important risk, while cerebral atheroembolism due to thrombus inside the aneurysm also poses a significant risk. Treatment of the proximal aneurysm surgery first began with the successful ligation of carotid artery aneurysms performed by Sir Astley Cooper in 1808.^[2] Following this, the first successful resection and re-anastomosis surgery was conducted by Dimtza in 1956.^[3] In this article, we present a case of a saccular aneurysm and stenosis of internal carotid artery successfully operated by saphenous vein patch plasty.

CASE REPORT

A 62-year-old male patient was admitted to our outpatient clinic with complaints of dizziness and obscuration of vision for nearly two years. The patient was hospitalized upon the detection of an internal carotid artery stenosis in Doppler ultrasound. Carotid digital subtraction angiography demonstrated an isolated and short-segment aneurysm at the level

of the carotid bulb and a 80-90% stenosis due to a 20x6 mm plaque formation in the internal carotid artery, extending from the right carotid bulb to the proximal internal carotid artery (Figure 1). Coronary angiography showed a normal right coronary artery (RCA) and plaques in circumflex (CX) and left anterior descending (LAD) artery. The patient had a history of hypertension, smoking, and right superficial femoral artery stenting in 2005 for peripheral arterial disease. On physical examination, no pulsatile mass was detected in the neck. The patient was operated under general anesthesia. During surgical exploration, a saccular aneurysm, stenosis, muscular defect in the medial layer, and the ballooning of the vessel wall were detected in the internal carotid artery. Common carotid, internal, and external carotid arteries were controlled with vascular tapes. Carotid artery vascular clamp was placed after 5,000 IU of heparin. Internal carotid artery stump pressure was measured over 50 mmHg and surgery was continued without shunting. There was a long segment, ulcerated atherosclerotic plaque in the internal carotid artery. Following aneurysmectomy and endarterectomy, the artery was successfully closed

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Figure 1. Angiographic appearance of the right carotid artery aneurysm and stenosis.

with saphenous vein patch plasty. The patient was discharged on the fifth postoperative day without any complication.

DISCUSSION

Aneurysm of extracranial carotid artery is a rare vascular lesion. Extracranial carotid artery aneurysms account for 0.1 to 2% of all carotid surgeries.^[4] Moreover, the most common causes of intracranial aneurysms are atherosclerosis, fibromuscular dysplasia, and trauma. Radak et al.^[5] showed aneurysms due to atherosclerosis (80.2%), trauma (6.6%), carotid surgery (6.6%), and fibromuscular dysplasia (5.5%). Additionally, Zhou et al.^[6] showed carotid artery aneurysms due to atherosclerosis (50%), pseudoaneurysms (30%), and trauma (12%). Although extracranial carotid artery aneurysms are rare, they may cause potentially fatal complications including embolization, rupture, and local compression. Therefore, early diagnosis and treatment are of utmost importance for these patients. Sometimes, diagnosis can be challenging in patients without neurological symptoms, in particular. Radak et al.^[5] showed that 31.9% of cases are asymptomatic at the time of diagnosis. Although the most common symptom is a pulsatile mass in the neck, it is not detected in calcified saccular aneurysms. However, Szopinski et al.^[7] showed no pulsatile mass in six of 15 patients. Although rare, aneurysms can be dangerous and they should be considered in the differential diagnosis in patients with non-specific symptoms, such as dysphagia, speech disorders, headache, neck pain, anisocoria, even in the absence of findings of

a pulsatile mass in the neck.^[8] We did not detect any pulsatile mass in the neck at the physical examination in our case. El Sabrout and Cooley^[9] showed a pulsatile mass in the neck in 59%, neurological symptoms in 43%, and signs of local compression in 10% in their study. In addition, most internal carotid artery aneurysms are hospitalized with embolic stroke.^[10] Symptoms such as Horner's syndrome and dysphagia caused by cranial nerve lesions require careful research about underlying possible vascular pathologies. The first step in the diagnosis is Doppler ultrasound, which is a simple and noninvasive imaging modality; however, it may be inadequate to detect aneurysms which are small or close to the skull base distal internal carotid artery lesions. Contrast computed tomography, magnetic resonance imaging, and angiography are other methods used in the diagnosis of such aneurysms. Also, arteriography is the gold standard for aneurysms due to occurrence of thrombus location and collateral circulation.^[11]

Furthermore, isolated and short-segment aneurysms at the level of the carotid bulb and a 80-90% stenosis due to a 20x6 mm plaque formation in the internal carotid artery was detected in our case angiographically. However, aneurysmal dilatation caused an atheroma plaque or ulcer. During surgery, muscular defect in the medial layer and the ballooning of the vessel wall brought us to the definitive diagnosis.

Moreover, open surgery is the preferred and accepted treatment method for extracranial internal carotid artery aneurysm.^[6] The primary indication for surgery is the prevention of permanent neurological damage from thromboembolic events.^[7] During surgery of large aneurysms, stroke due to distal embolization of atherosclerotic debris and damage due to cranial nerve traction are the potential risks.^[12] In addition, aneurysm size, location, and etiology are the decisive factors in choosing the surgical procedure for a surgeon. Surgical treatment approaches include clipping, resection, and end-to-end anastomosis, resection and graft placement, extracranial to intracranial bypass, patch plasty and carotid artery ligation. Following aneurysmectomy and endarterectomy, we repaired internal carotid artery with saphenous vein patch plasty in our case. In some cases, endovascular treatment can be recommended as an alternative to surgery. However, intracranial carotid artery aneurysms and extracranial internal carotid artery stenoses in different localizations were published in the literature.^[13,14]

In conclusion, the most characteristic feature of our case was the concurrence of an internal carotid artery stenosis with a saccular aneurysm. Review of the literature revealed a few reports of concurrence of an arterial aneurysm and an internal carotid artery stenosis.

Declaration of conflicting interests

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REFERENCES

- McCann RL. Basic data related to peripheral artery aneurysms. *Ann Vasc Surg* 1990;4:411-4.
- Cooper A. Account of the first successful operation performed on the common carotid artery for aneurysm in the year of 1808 with postmortem examination in the year 1821. *Guys Hosp Pep* 1836;1:53.
- Dimtza A. Aneurysms of the carotid arteries; report of two cases. *Angiology* 1956;7:218-27.
- Rosset E, Albertini JN, Magnan PE, Ede B, Thomassin JM, Branchereau A. Surgical treatment of extracranial internal carotid artery aneurysms. *J Vasc Surg* 2000;31:713-23.
- Radak D, Davidović L, Vukobratov V, Ilijevski N, Kostić D, Maksimović Z, et al. Carotid artery aneurysms: Serbian multicentric study. *Ann Vasc Surg* 2007;21:23-9.
- Zhou W, Lin PH, Bush RL, Peden E, Guerrero MA, Terramani T, et al. Carotid artery aneurysm: evolution of management over two decades. *J Vasc Surg* 2006;43:493-6.
- Szopinski P, Ciostek P, Kielar M, Myrcha P, Pleban E, Noszczyk W. A series of 15 patients with extracranial carotid artery aneurysms: surgical and endovascular treatment. *Eur J Vasc Endovasc Surg* 2005;29:256-61.
- Yetkin U, Yürekli İ, Gürbüz A. Extracranial internal carotid artery aneurysms. *The Internet J Thorac and Cardiovasc Surg* 2007;10:2.
- El-Sabroun R, Cooley DA. Extracranial carotid artery aneurysms: Texas Heart Institute experience. *J Vasc Surg* 2000;31:702-12.
- Hurst RW, Haskal ZJ, Zager E, Bagley LJ, Flamm ES. Endovascular stent treatment of cervical internal carotid artery aneurysms with parent vessel preservation. *Surg Neurol* 1998;50:313-7.
- Windfuhr JP. Aneurysm of the internal carotid artery following soft tissue penetration injury. *Int J Pediatr Otorhinolaryngol* 2001;61:155-9.
- Bardakçı H, Akgül A, Babaroğlu S, Kaplan S, Beyazıt M. Ekstrakranial internal karotis arter anevrizması; olgu sunumu. *Damar Cer Derg* 2006;15:49-52.
- Cho YD, Jung KH, Roh JK, Kang HS, Han MH, Lim JW. Characteristics of intracranial aneurysms associated with extracranial carotid artery disease in South Korea. *Clin Neurol Neurosurg* 2013;115:1677-81.
- Shumann MU, Mirzai S, Samii M, Vorkapic P. Xenon/CT CBF measurements as valuable diagnostic tool in a case of bilateral occlusive cerebrovascular disease associated with intracranial aneurysm. *Acta Neurol Scand Suppl* 1996;166:104-9.