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SNI: Neurovascular

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Case Report

Giant saccular aneurysm of the cervical internal carotid artery treated with aneurysmectomy and side-to-end anastomosis

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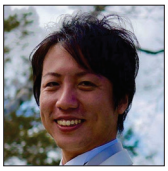

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Received : 22 April 2023
Accepted : 01 June 2023
Published : 09 June 2023

DOI
10.25259/SNI_351_2023

Quick Response Code:

ABSTRACT

Background: Cervical aneurysms are rare, accounting for <1% of all arterial aneurysms, including dissecting, traumatic, mycotic, atherosclerotic, and dysplastic aneurysms. Symptoms are usually caused by cerebrovascular insufficiency; local compression or rupture is rare. We present the case of a 77-year-old man with a giant saccular aneurysm of the cervical internal carotid artery (ICA), which was treated with aneurysmectomy and side-to-end anastomosis of the ICA.

Case Description: The patient had experienced cervical pulsation and shoulder stiffness for 3 months. The patient had no significant medical history. An otolaryngologist performed the vascular imaging and referred the patient to our hospital for definitive management. Neurological deficits were not observed. Digital subtraction angiography showed a giant cervical aneurysm with a diameter of 25 mm within the ICA, and there was no evidence of thrombosis within the aneurysm. Aneurysmectomy and side-to-end anastomosis of the cervical ICA were performed under general anesthesia. After the procedure, the patient experienced partial hypoglossal nerve palsy but fully recovered with speech therapy. Postoperative computed tomography angiography revealed the complete aneurysm removal and patency of the ICA. The patient was discharged on postoperative day 7.

Conclusion: Despite several limitations, surgical aneurysmectomy and reconstruction are recommended to eliminate the mass effect and to avoid postoperative ischemic complications, even in the endovascular era.

Keywords: Aneurysmectomy, Cervical aneurysm, Reconstruction, Side-to-end anastomosis

INTRODUCTION

Aneurysms of the cervical internal carotid artery (ICA) are rare, accounting for <0.2–5% of all carotid operations and <1% of all arterial aneurysms.[9,10] There are several pathological types of ICA aneurysms, including dissecting, traumatic, mycotic, atherosclerotic, and dysplastic aneurysms. Symptoms are usually caused by cerebrovascular insufficiency, with few reports of local compression or rupture.[14] Although endovascular procedures, such as coiling and stenting, have been described, surgical reconstruction is considered the gold standard.[11] Here, we report a

case of a giant saccular aneurysm of the cervical ICA treated with aneurysmectomy and side-to-end anastomosis.

CASE REPORT

The patient was a 77-year-old man with no significant medical history. He had cervical pulsation and shoulder stiffness for 3 months, but neurological deficits were not observed. The patient was referred for a palpable swelling in the left cervical region. Magnetic resonance imaging performed on admission revealed a vascular lesion measuring 25 mm in diameter [Figure 1a]. Digital subtraction angiography performed after admission revealed a giant saccular ICA aneurysm with flow disturbance, elongation, and tortuosity [Figures 1b-e]. Single-photon emission computed tomography (CT) showed no hypoperfusion [Figure 1f]. There was no evidence of thrombosis in the aneurysm. No other dysplastic or atherosclerotic lesions were found in the other vessels except in the contralateral cervical ICA. Collateral flow through the anterior and posterior communicating arteries without delay in the capillary phase was observed with left cervical compression, suggesting that shunting during the anastomosis was unnecessary. The patient provided informed consent for the procedure.

Under general anesthesia and motor-evoked potential (MEP), the aneurysm was excised, and side-to-end anastomosis of the cervical ICA was performed [Figure 2]. The aneurysm was exposed using a standard approach along the anterior border of the sternocleidomastoid muscle (SCM), dissecting from the parotid gland (PG) for a high-cervical approach [Figure 2a]. An aneurysm was observed under the thinly stretched internal jugular artery. After the vagus and hypoglossal nerves were detected, the common carotid artery (CCA), external carotid artery (ECA), and proximal and distal ICA were dissected. Subsequently, the CCA, ECA, and distal ICA were occluded. The excess length of the ICA allowed aneurysmectomy with side-to-end anastomosis using the Gore-Tex suture [Figure 2b]. The total ischemia time was 40 min, and no MEP changes were reported. Histopathological examination revealed an atherosclerotic aneurysm without dysplasia [Figure 3a]. The aneurysmal wall showed atheromatous changes with clusters of foamy cells and high cholesterol deposition. Elastica van Gieson staining revealed the disappearance of elastic fibers in the internal elastic lamina and media [Figure 3b]. The patient experienced a partial deficit in the hypoglossal nerve after the procedure, which fully recovered at discharge with speech therapy. No other neurological deficits were observed. CT angiography on postoperative day 1 showed complete removal of the aneurysm and a patent cervical ICA anastomosis [Figure 3c]. The patient was discharged on postoperative day 7. The patient provided written informed consent for the publication of the study.

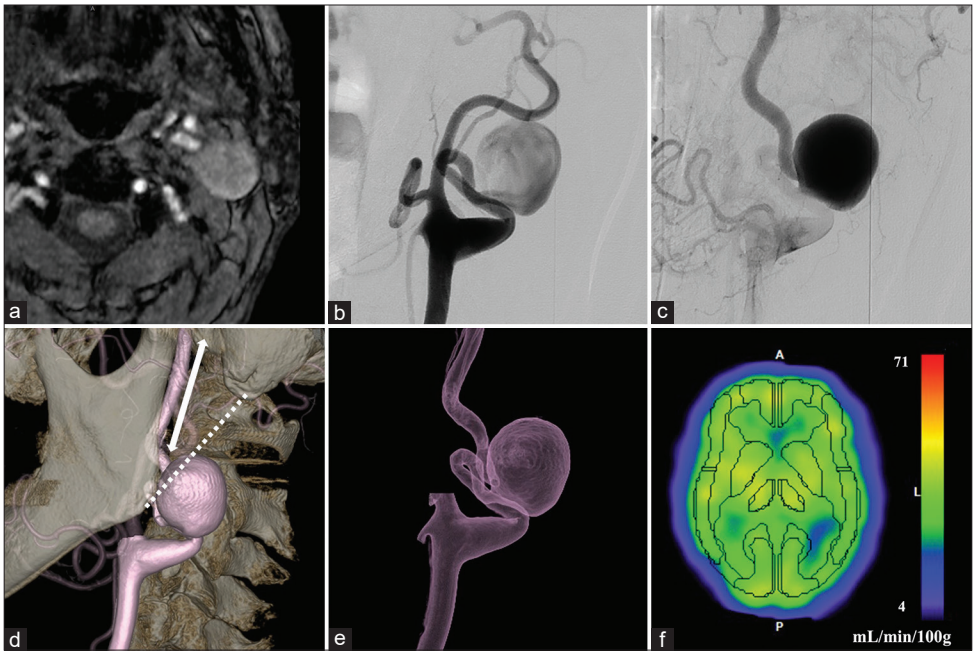

Figure 1: Preoperative vessel imaging. Magnetic resonance image showing a vascular lesion in the left neck with a diameter of 25 mm (a). Digital subtraction angiograms in the early (b) and late (c) phases showing a giant saccular aneurysm of the cervical internal carotid artery (ICA) with the disturbance of blood flow. 3D-rotational angiogram showing the elongation and tortuosity of the vessel (d and e); the dotted line represents the Blaisdel line. The length of the distal ICA was 35 mm (double arrow). No hypoperfusion was observed on single-photon emission computed tomography images (f); the color bar represents the cerebral blood flow (mL/min/100g) of each individual voxel.

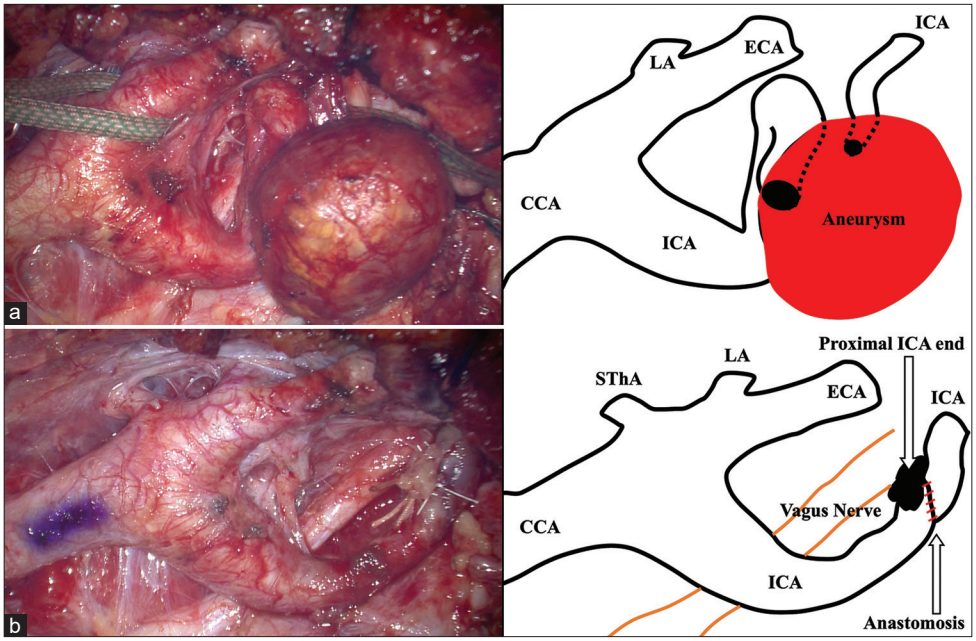

Figure 2: Intraoperative images and schemes. Exposure of the aneurysm was performed through the standard approach along the anterior line of the sternocleidomastoid muscle (a), and aneurysmectomy and side-to-end anastomosis of the internal carotid artery were performed (b). CCA: Common carotid artery, ECA: External carotid artery, ICA: Internal carotid artery, LA: lingual artery, SThA: Superior thyroid artery.

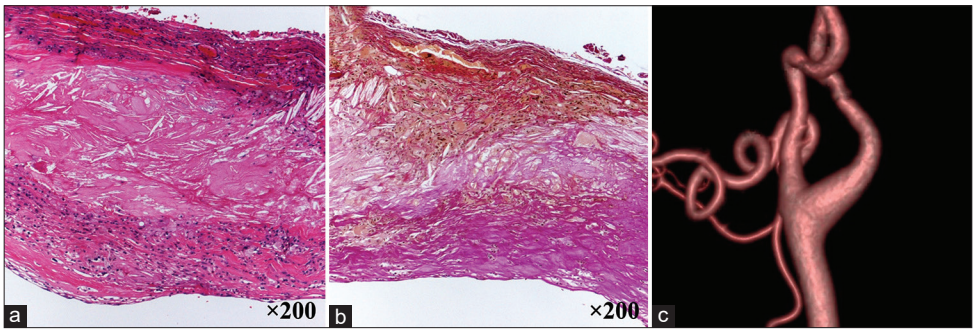

Figure 3: Histopathological images showing the atherosclerotic aneurysm. The aneurysmal wall shows atheromatous changes with clusters of foamy cells and high cholesterol deposition (a). Elastica van Gieson staining showing the disappearance of elastic fibers in the internal elastic lamina and media (b). Postoperative computed tomography angiograph showing complete aneurysm removal and patency of the internal carotid artery (c).

DISCUSSION

Surgical treatment of cervical carotid artery aneurysms is rare, accounting for <0.2% of all cervical procedures.[9,10] The most common cause of cervical aneurysms is atherosclerosis (42%), as in our case, followed by dysplasia (20%).[7,13,14] Aneurysms can be located proximal and distal to the Blaisdell line[3] between the angle of the mandible and the tip of the mastoid process. Of these two classifications, the proximal type is usually an atherosclerotic fusiform aneurysm involving the CCA, bifurcation, and ICA origin. The distal type is usually saccular and located near the skull base. Our case is rare because the aneurysm was saccular and located within the ICA despite being the proximal type.

Although the exact rate of aneurysm rupture is unclear, surgical treatment should be considered to avoid rupture, thromboembolism, and mass effects, including lower cranial nerve palsy and discomfort. Several therapeutic options have been described for cervical aneurysms, including aneurysmectomy with or without reconstruction, proximal ligation, endovascular coiling, or stenting, and hybrid intervention.[9,12] Among these procedures, only aneurysmectomy with reconstruction can eliminate the

mass effect and maintain anterograde blood flow.[5] Although there is no evidence of its long-term effectiveness, various studies have demonstrated that surgical procedure is the most effective treatment modality for cervical aneurysms.[2,8,15] However, it has some limitations, including cranial nerve damage, which occurs in 11.8% of cases after surgical procedures.[16] The other problem is that the distal ICA is more difficult to manage in lesions near the skull base. When considering the surgical procedure, it is vital to determine the position of the cervical aneurysm in relation to the skull base and the length of the distal ICA. Despite these disadvantages, aneurysmectomy with reconstruction should be the first-line treatment, even in the endovascular era.

Previous reports have demonstrated that the endovascular procedure is an effective alternative for treating cervical aneurysms, with fewer procedure-related complications and shorter recovery times.[17] The most important problem in endovascular procedures is reprocessing the aneurysm and restenosis within the stent.[5,8] Endovascular procedures should be recommended for lesions with a higher position, shorter distal ICA, and no healthy vessels, such as pseudoaneurysms, traumatic aneurysms, or dissecting aneurysms. In our case, we selected the surgical procedure because the aneurysm was proximal with sufficient length of the distal ICA, and the patient had no history of trauma, infection, or radiation therapy.[8]

There are two methods of ICA reconstruction: End-to-end and side-to-end anastomoses. No previous studies have compared these two methods in the human carotid artery. The two methods showed no significant differences in patency and complication rates in the rat carotid artery.[6] In the human free flap procedure, the differences in the rates of thrombosis and tissue failure between the two methods were also marginal and non-significant.[1] Side-to-end anastomosis is advantageous in vessel size discrepancy or when the vessel morphology is unsuitable for end-to-end anastomosis. Furthermore, for many neurosurgeons, side-to-end anastomosis is the most common method for superficial temporal artery-middle cerebral artery anastomosis and high-flow bypass, and it is expected to reduce complications. Therefore, we performed side-to-end anastomosis based on vessel morphology. In our case, the distal ICA was anastomosed to the curved side of the proximal ICA because the end of the proximal ICA was curved at a right angle. Regardless of the methods, it is crucial to dissect around the PG from the anterior edge of the SCM to expose the distal ICA. The PG should be peeled carefully from the SCM with the deep cervical fascia because the PG and SCM are tightly connected through the deep cervical fascia. Shunting during anastomosis should be considered in patients without collateral flow to prevent ischemic complications. However, as in our case, the ICA distal to the aneurysm often has a smaller diameter than the shunt tube (8–9Fr) for carotid endarterectomy because the aneurysm absorbs blood pressure and wall shear stress.[4] Adequate preoperative evaluation is essential when using a shunt tube.

CONCLUSION

Here, we presented a rare case of a giant saccular aneurysm of the cervical ICA. Despite the limitations, surgical aneurysmectomy and vessel anastomosis are recommended to prevent postoperative ischemic complications, even in the endovascular era.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Maeda T, Sakai S, Osakabe M, Okawara M, Nomura T, Yamaguchi H, *et al*. Giant saccular aneurysm of the cervical internal carotid artery treated with aneurysmectomy and side-to-end anastomosis. Surg Neurol Int 2023;14:202.