



# Large Carotid Aneurysm: An Illustrative Case of Open Surgical Repair

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## Abstract

**Background** Extracranial carotid artery aneurysms are rare and are often localized at the level of the carotid bulb or in the distal internal carotid artery. Generally asymptomatic until an embolic event or a local compression reveals their presence, the rupture is rare.

**Case Report** We presented a case of a 68-year-old female referred to our hospital for a pulsatile mass on the right side of her neck with no other symptoms. The patient had a history of hypertension that was medically controlled. The duplex ultrasound confirmed the presence of a large internal carotid aneurysm. Angiotomography shows a large 5 cm diameter type 1 aneurysm of the right internal carotid artery and a type 1 2.7 cm diameter of the left carotid artery. Open surgery with aneurysmal resection and direct end-to-end anastomosis was performed with an uneventful course.

**Conclusion** This is an illustrative case of managing large carotid aneurysms by open surgery.

## Keywords

- ▶ extracranial internal carotid aneurism
- ▶ open surgery
- ▶ bilateral internal carotid aneurysm

## Introduction

Extracranial carotid artery aneurysms are a rare pathology with an incidence of 0.3% among aneurysms in general. The main etiology is atherosclerosis that is responsible for one-third of all carotid aneurysms, while previous carotid surgery or carotid trauma is the cause of most pseudoaneurysms. Less frequent mycotic aneurysms are related to salmonella or syphilis. Finally, other possible etiologies are connective tissue disease, fibromuscular dysplasia Behçet's disease, and Takayasu syndrome.<sup>1</sup> Localization varies from the common carotid artery involving the carotid bifurcation to the internal carotid artery (ICA), mainly in its middle and distal tract.

Morphologically from distal to proximal, we describe five different types where type 1 is localized in the ICA in its mid-distal tract, type 2 involves the proximal tract of ICA, and type 3 the carotid bifurcation is aneurysmatic. At the same time, in type 4, the common carotid artery also presents an aneurysmal dilatation. Finally, in type 5, the aneurysm is limited to the common carotid artery<sup>2</sup> since the first case was treated with a simple carotid ligation by Sir Astley Cooper in 1805,<sup>3</sup> Schechter review count 853 cases published in literature until 1977.<sup>4</sup> Asymptomatic aneurysms, especially in their early stages, are generally diagnosed by the presence of a pulsatile mass in the neck. Other symptoms are neurological due to embolization events and local compression as

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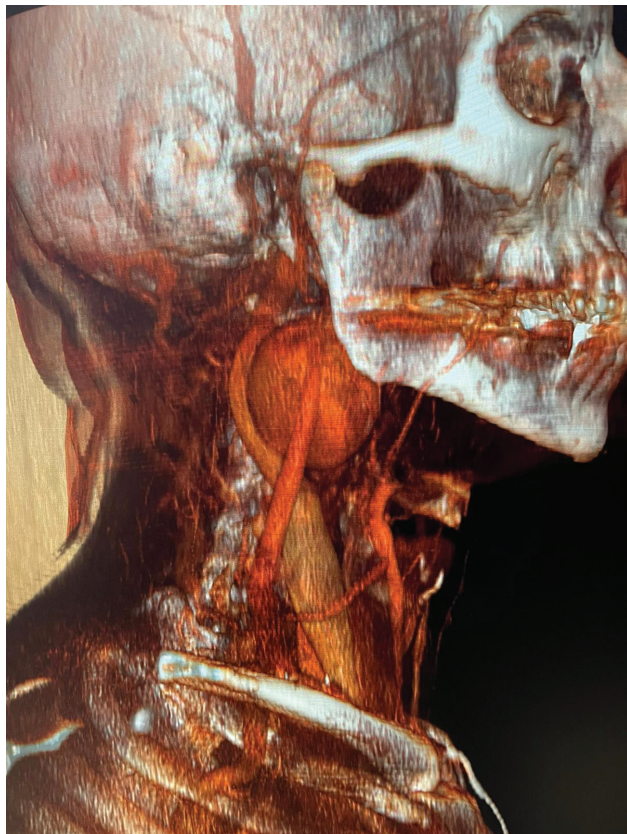
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Horner's syndrome or dysphagia. A rupture is a rare event. When possible, the preferred treatment is surgical with direct termino-terminal anastomosis. Also, bypass is possible with the interposition of a vein conduit which is preferred over synthetic graft.<sup>5</sup> Carotid ligation must be avoided due to up to a 30% risk of stroke.<sup>6</sup> Endovascular procedures are limited to autoexpandable covered stents. For their use, it is necessary to ensure a long enough proximal and distal landing zone, elongations, and tortuosity, which may difficult the stent apposition.

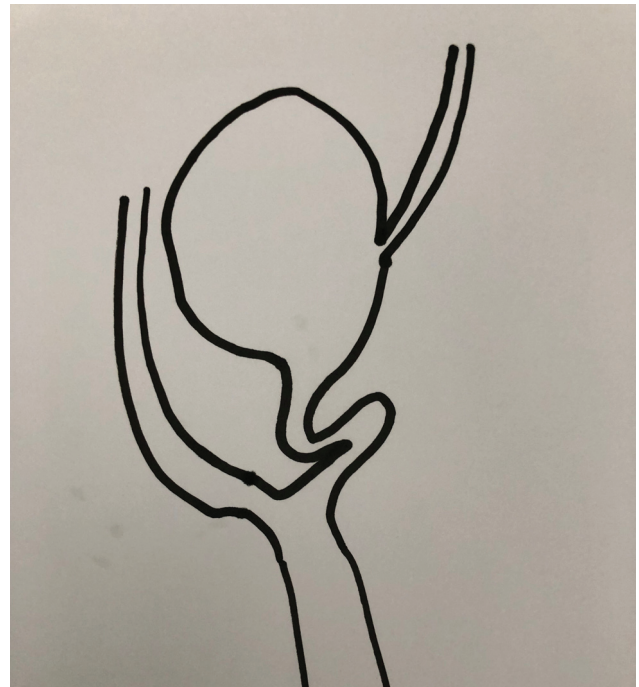
## Case Report

We present a case of 68-year-old female referred to our clinic for a pulsatile mass localized in the lateral right side of the neck with no other symptoms. The patient had a history of hypertension that was medically controlled. Duplex ultrasound of the supra-aortic trunks was performed at the assessment, revealing a large aneurysm of the right carotid artery at the bifurcation level. A smaller aneurysm was also seen in the distal internal left carotid artery. Computed tomography angiography (CTA) confirmed the presence of a bilateral ICA aneurysm, 5 cm in diameter on the right (→Fig. 1) and 2.7 cm on the left. The internal right carotid artery was elongated in an S shape from bifurcation to the aneurysm (→Fig. 2).

Under general anesthesia with a lateral-cervical incision, the common, external, and internal carotids were controlled

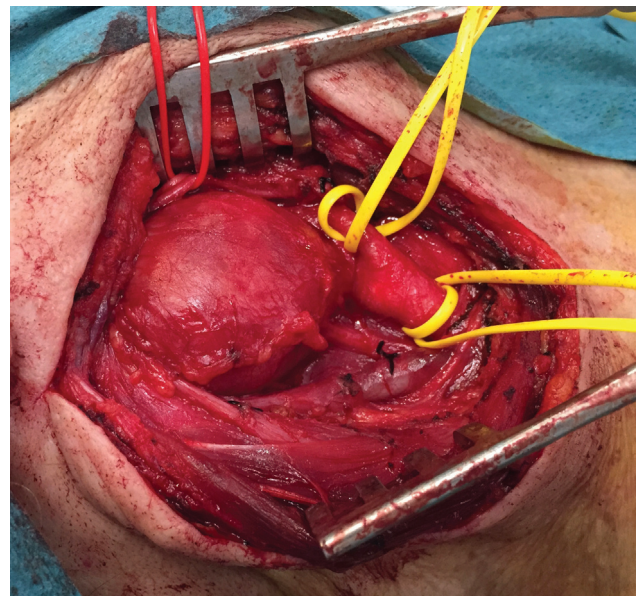


**Fig. 1** Computed tomography reconstruction of internal carotid artery aneurysm.

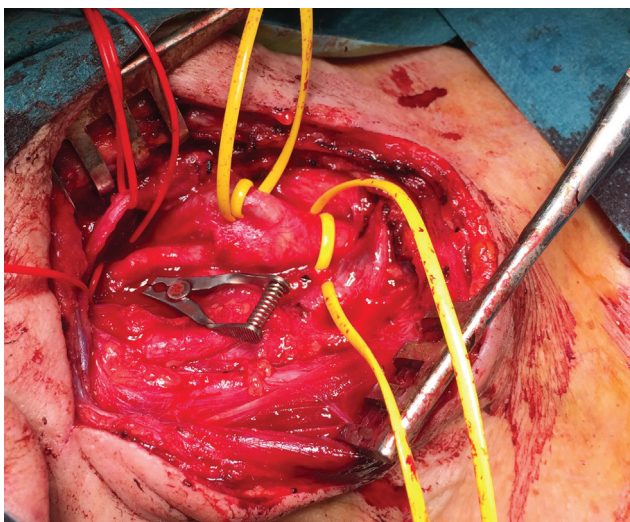


**Fig. 2** The computed tomography surgeon's drawing of the S shape, the proximal elongation of the internal carotid artery.

with vessel loops. Special attention was taken for reducing aneurysm manipulation to avoid possible embolization. The hypoglossal nerve and digastric muscle were also identified (→Fig. 3). The proximal portion of the ICA was confirmed to be elongated. We gently manipulated the aneurysm laterally, and we confirmed the feasibility of an end-to-end anastomosis as the length of the normal proximal and distal carotid artery made it possible. The back bleeding pressure of the ICA was measured; its value was above 50 mm Hg; thus, we proceeded after systemic heparin and cross-clamping to the



**Fig. 3** Internal carotid aneurysm, red vessel loop: hypoglossal nerve.



**Fig. 4** After aneurysm resection, end-to-end anastomosis.

aneurysm resection and direct end-to-end anastomosis without placing a shunt (→ **Fig. 4**).

The patient recovered with no neurological symptoms; she presents despite drains of the surgical area with a postoperative hematoma that resolved naturally in 3 weeks. She stayed asymptomatic during the 2 years follow-up with a peak systolic velocity of 80 cm/sec in common carotid and 130 cm/sec in internal.

The left carotid aneurysm was also controlled at follow-up with no changes at the present day.

## Conclusion

Despite being a rare pathology, an extracranial carotid aneurysm could lead to an embolic event or a local compression. Duplex ultrasound is the preferred diagnostic image test, even though CTA is mandatory for surgery planning. Smaller aneurysms with a clear landing zone can be managed in an endovascular way. A giant aneurysm, primarily types 1, often presents an elongated proximal ICA. Such elongation compromises the endovascular possibili-

ties due to the difficult navigation of the endovascular devices. Generally, it allows an end-to-end anastomosis to avoid graft interposition after the aneurysmal removal. Shunt utilization in our practice is selective when the reflux pressure from ICA is lower than 50 mm Hg. When the proximal ICA is elongated, special care must be taken in shunt placement.

### Authors' Contributions

Both authors contributed to the conception, drafting, and finalization of the case report.

### Compliance with Ethical Principles

Reporting of single case reports and small case series does not require prior ethical approval in our institutions.

### Consent for Publication

The authors confirm that the patient provided consent for publication on anonymous basis.

### Sponsorship and Funding

None.

### Conflict of Interest

None declared.

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