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Giant cell arteritis as a cause of extracranial internal carotid artery aneurysm: a case report

Ihor Kobza[1], Yuliia Mota[1*] and Volodymyr Vovk[2]

Abstract

Background This report presents the management of patient with extracranial internal carotid artery pseudoaneurysm due to giant cell arteritis.

Case presentation Left internal carotid artery pseudoaneurysm was diagnosed in a 57-year-old Ukrainian woman, which became a direct indication for surgical treatment involving aneurysm resection and internal carotid artery reimplantation. The used reconstruction technique with oblique cutting of internal carotid artery, aneurysm resection, ellipse-form anastomosis formation, and distal intima fixation prevents the dissection, restenosis, and aneurysm of anastomosis in the long-term postoperative period. Histopathological examination revealed the giant cell arteritis of the internal carotid artery.

Conclusion This case emphasizes the importance of open surgical treatment of extracranial carotid artery aneurysms, which allows to perform optimal carotid artery reconstruction and also define the rare etiology of disease.

Keywords Extracranial aneurysm of carotid artery, Giant cell arteritis, Diagnosis, Resection of aneurysm, Arterial reconstruction

Introduction

Extracranial carotid artery aneurysm (ECAA) is a rare vascular disease, with a reported incidence of 0.4–4.0% among all peripheral arterial aneurysms [1–3]. ECAAs are classified into true aneurysms, most commonly occurring as a result of atherosclerotic lesion, and pseudoaneurysms, caused by trauma, infection, or prior neck surgery. The rare etiology of ECAAs includes fibromuscular dysplasia, arteritis, connective tissue diseases, Eagle syndrome, and radiation [3–5]. Patients with ECAA have a high risk of ischemic stroke due to distal embolization and internal carotid artery (ICA) thrombosis. Therefore, due to a significant risk of ischemic events and high mortality, ECAA requires active surgical tactics that involve aneurysm resection with arterial reconstruction, ligation of artery, or endovascular intervention [3–8].

We consider it expedient to share the following clinical case report because of the rarity of this pathology and the peculiarities of its clinical course, diagnosis, and surgical management.

Case presentation

A 57-year-old Ukrainian woman was admitted to the Vascular Surgery Department of Lviv regional clinical hospital on 29 April 2023. The patient complained of periodic dizziness, headache, coordination disorders, hand tremor, involuntary violent movements of the head and neck, increased blood pressure to 170/90 mmHg, and general weakness. Anamnesis showed left middle cerebral artery ischemic stroke with right-sided pyramid insufficiency, persistent cephalgia, and moderate ataxia in June 2021. Since then, the patient had been under neurologist observation owing to radiologically isolated

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syndrome of multiple sclerosis (according to magnetic resonance imaging: signs of focal demyelinating lesion of the periventricular brain areas).

Objectively, the patient's status was good. Vital signs were stable and within normal limits. Focal neurological symptoms were not detected. The pulsation of the main arteries was determined.

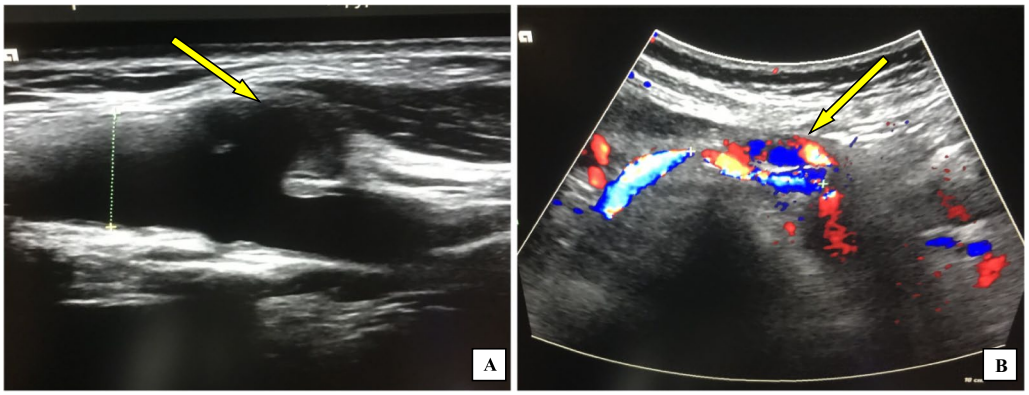

Fig. 1 Duplex ultrasonography (USG) of CAs: saccular aneurysm (yellow arrows) of common carotid artery (CCA) bifurcation (**A**, **B**)

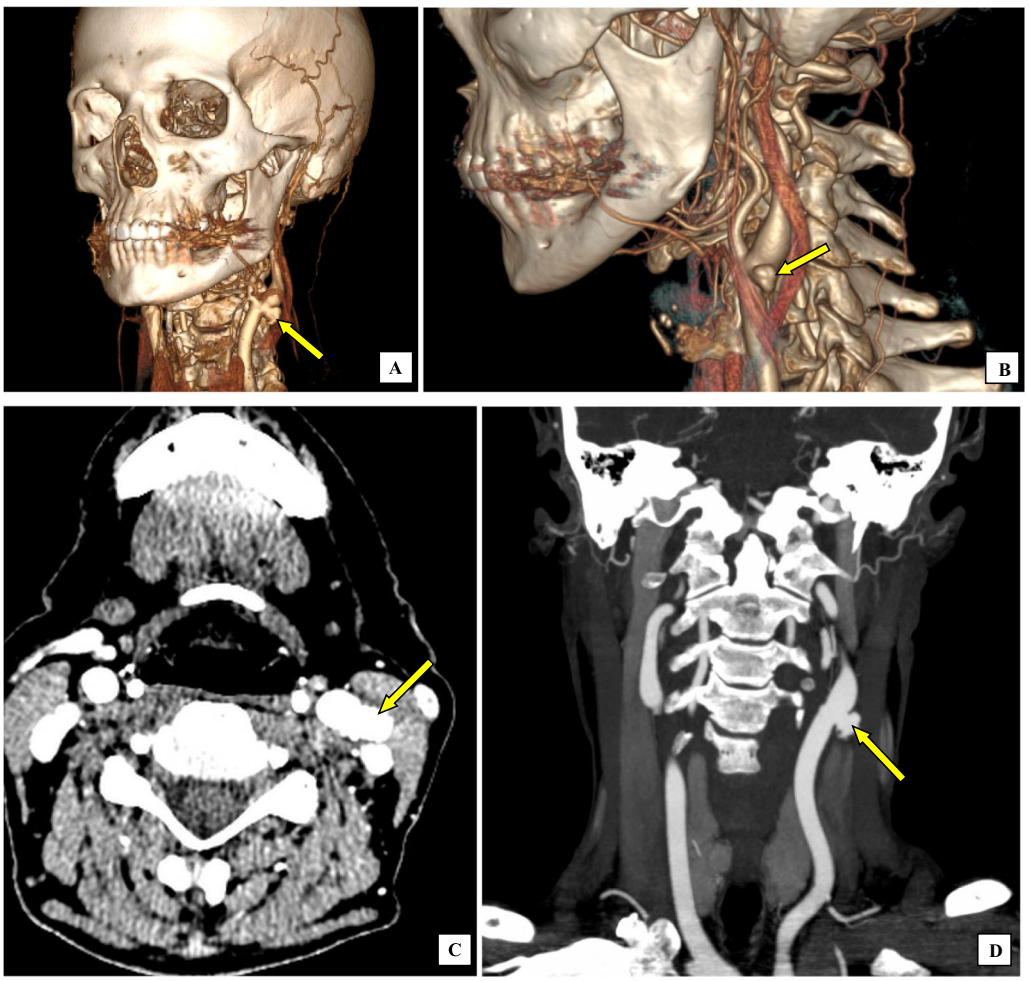

Fig. 2 Computed tomography (CT) angiography of head and neck: **A**, **B** 3D reconstruction of neck vessels; **C**, **D** transversal and frontal views (yellow arrows—pseudoaneurysm of left internal carotid artery, size 11.0×6.0 mm; neck, size 6.0 mm)

Duplex ultrasonography (USG) of carotid and vertebral arteries (Fig. 1) showed a saccular aneurysm of the left common carotid artery (CCA) bifurcation, 16.0 mm in diameter, with a "fresh" thrombosis of the aneurysmal sac, probably a pseudoaneurysm.

Computed tomography (CT) angiography of head and neck (Fig. 2) showed on the posterolateral wall of the left ICA bulb a mushroom-shaped pseudoaneurysm, with size 11.0×6.0 mm, and one on the neck of aneurysm with size 6 mm. The circle of Willis is incomplete (posterior communicating arteries are not visualized).

On 1 May 2023, 11^{50}–13^{30} operation–resection of ICA pseudoaneurysm and ICA reimplantation were performed (Fig. 3).

Under local anesthesia (Sol. Novocaini 0.5%) via a neck incision along the anterior border of the left sternocleidomastoid muscle using a retrojugular approach, common, internal and external Carotid arteries (CAs) were mobilized: a pseudoaneurysm of the ICA bulb with saccular posterolateral wall bulging was revealed, 11.0 mm in diameter, where the diameter of the distal segment of the CA was 4.0 mm. Systemic heparinization was performed. Cross-clamping CA test showed normal tolerance. After oblique cutting of ICA above the pseudoaneurysm, the last one was resected, and ICA was reimplanted into the CCA. The duration of CA clamping was 20 min. Blood flow restoration, hemostasis, wound drainage, and suturing of the wound was performed, and aseptic bandage was applied.

The postoperative period was without complications. The patient received antiplatelet therapy. The postoperative wound healed by primary tension.

Histopathological examination revealed giant cell arteritis (GCA) of ICA with aneurysm formation (Fig. 4).

The patient was discharged on 5 May 2023 in good status on recommendation of neurologist, vascular surgeon, and rheumatologist observation.

On follow-ups 3, 6, and 12 months after surgery, the patient had no complaints. At the control duplex USG, blood flow through the left ICA was normal (Fig. 5).

Discussion

GCA is a systemic granulomatous vasculitis of unknown etiology commonly affecting large- and medium-sized arteries [9]. The well-known clinical phenotype of GCA is temporal arteritis (Horton's disease), but approximately

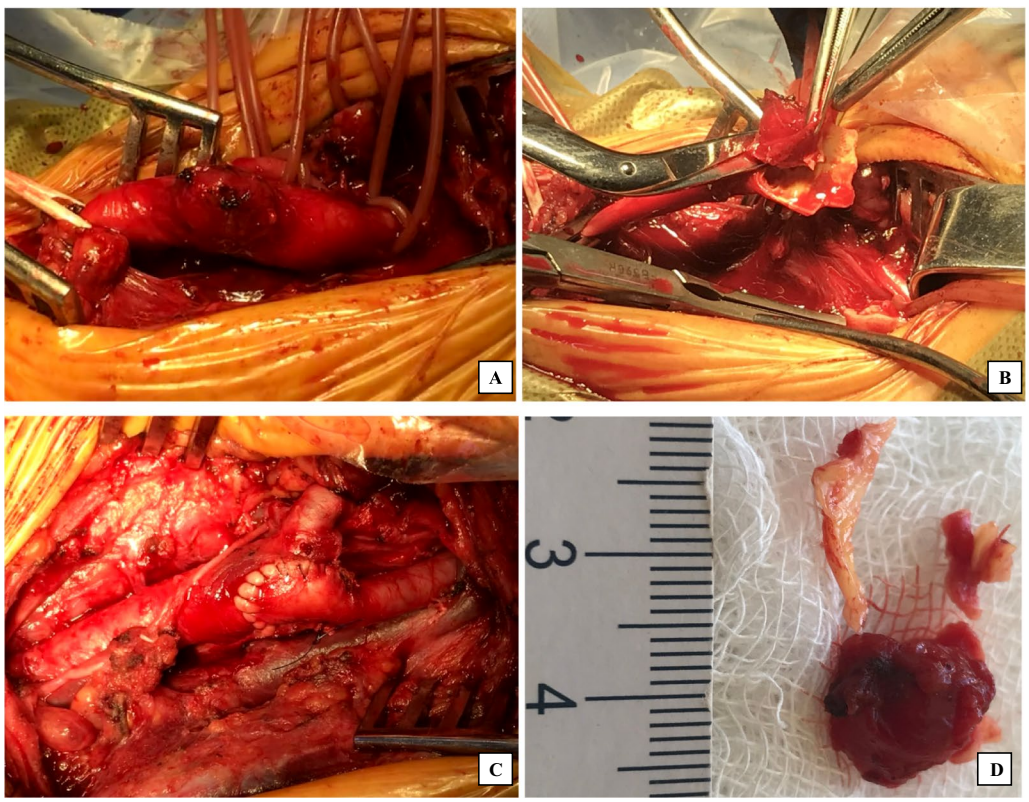

Fig. 3 Intraoperative photos: **A** saccular pseudoaneurysm of internal carotid artery, **B** resection of pseudoaneurysm; **C** complete view of carotid artery reconstruction; **D** resected pseudoaneurysm

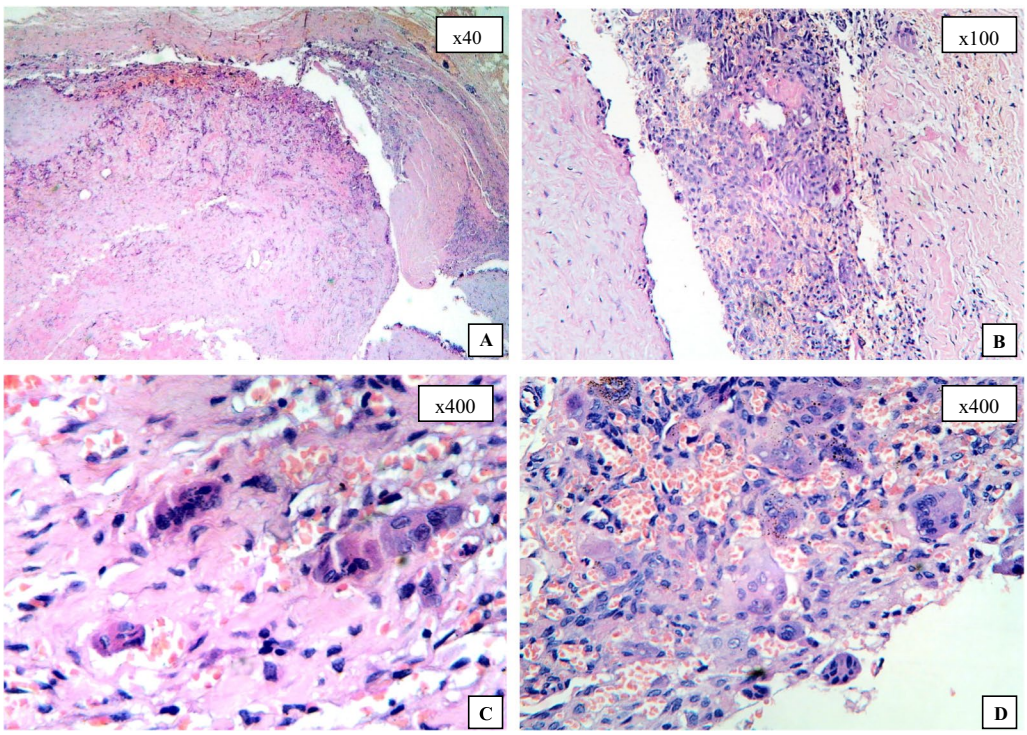

Fig. 4 Histologic sections—giant cell arteritis of internal carotid artery [hematoxylin and eosin (H&E) stain]: **A**, **B** inflammatory infiltrate in the middle layer of arterial wall, where the vascular wall is stratified with aneurysm formation and the intima is thickened; **C**, **D** inflammatory infiltrate is composed of lymphocytes, macrophages, and giant multinucleated cells

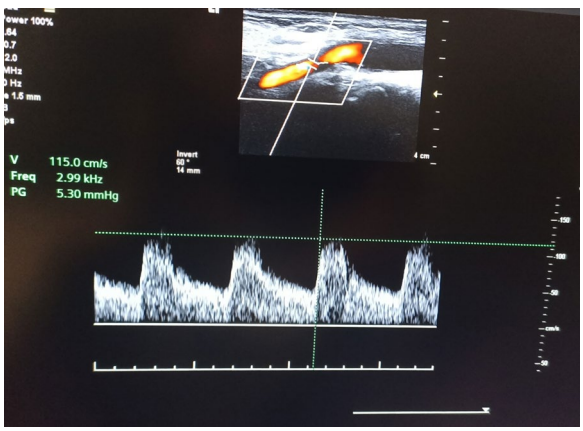

Fig. 5 Duplex ultrasonography (USG) 12 months after surgery showing normal blood flow through the left internal carotid artery

a third of patients have extracranial localization of vasculitis with involvement of the aorta and its proximal branches, more often carotid, subclavian, and axillary arteries, with risk of their dissection and aneurysmal dilatation [10–13].

In typical cases with temporal arteritis, if at least three of the five criteria proposed by the American College of Rheumatology are present in a single case, the diagnosis can be confirmed with a sensitivity of 93.5% and a specificity of 91.2%: age of 50 years or older, new-onset headache, temporal artery tenderness or decreased pulsation, erythrocyte sedimentation rate of at least 50, and abnormal temporal artery biopsy results [14].

However, quite often, the diagnostic delay of GCA is caused by nonspecific symptoms at extracranial localization or absence of clinical manifestations of the aortic arch lesions at classical temporal vasculitis [13]. Although loss of vision is considered the most dangerous complication of GCA, the main causes of mortality are cerebral ischemia and aortic aneurysm [15]. There are several publications in the literature, mainly small case series reporting about stenosis and occlusion of extracranial vessels due to GCA, mostly involving the vertebrobasilar territory [15–18]. Carotid and vertebral artery dissection at GCA with the development of severe cerebral ischemic complications is also considered quite rare [19].

Literature data about extracranial GCA are variable and depend on the used diagnostic methods. Current

European clinical guidelines recommend Doppler USG as the first method of noninvasive diagnosis of extracranial arteritis, and a symptom of "halo" sign has a prognostic value because it is associated with possible ischemic complications [20, 21]. Using angiography, the prevalence of extracranial involvement is 20–67%; positron emission tomography can be useful in diagnosis in 83–92% cases [9, 22].

In our observation, in a 57-year-old Ukrainian woman, left ICA pseudoaneurysm was diagnosed, which became a direct indication for surgical treatment—aneurysm resection and ICA reimplantation. The used reconstruction technique with oblique cutting of ICA, aneurysm resection, ellipse-form anastomosis formation, and distal intima fixation prevents the dissection, restenosis, and aneurysm of anastomosis in the long-term postoperative period. Histopathological examination revealed the GCA of ICA.

Analyzing the literary sources, we found only one clinical case reporting on ECAA due to GCA, which indicates the uniqueness of this pathology and the nonspecificity of its clinical manifestations [23].

This clinical case confirms the advantages of open surgical treatment of ECAAs, which allows to perform optimal carotid artery reconstruction and also define the etiology of the disease.

Conclusion

Reconstructive surgery of ECAAs is a highly effective method of treatment that allows to define the rare etiology of disease, prevent the development of severe complications, and achieve good long-term results.

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Author contributions
Ihor Kobza—conception of the idea, final approval of the version to be published, operating surgeon. Yuliia Mota—review of the literature, writing of the manuscript. Volodymyr Vovk—interpretation of histological assays.

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Availability of data and materials
The data that support the findings of this study are available from the corresponding author, Yuliia Mota, upon reasonable request.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests
The authors declare that they have no competing interests. All co-authors have seen and agree with the contents of the manuscript, and there is no financial interest to report. We certify that the submission is original work and is not under review at any other publication.

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