Coexistence of Extracranial Internal Carotid Artery Aneurysm and Multiple Intracranial Aneurysms

—Case Report—

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Abstract

A rare case of extracranial internal carotid artery (ICA) aneurysm coexisting with intracranial multiple aneurysms in a 64-year-old female is reported. The three intracranial aneurysms were clipped uneventfully by two-stage craniotomies. The extracranial ICA aneurysm at the infratemporal region was excised through a high cervical route and ICA was reconstructed by an end-to-end direct anastomosis. Ours is the first case reported of extra- and intracranial aneurysms surgically treated successfully.

Key words: carotid artery, end-to-end anastomosis, extracranial aneurysm, multiple aneurysms

Introduction

Extracranial internal carotid artery (ICA) aneurysms are uncommon vascular lesions.\textsuperscript{4,5} This report presents an unusual case of extracranial ICA aneurysm coexisting with intracranial multiple aneurysms. Incidence, etiology, and treatment modalities of extracranial ICA aneurysms are discussed.

Case Report

A 64-year-old female was admitted to a local emergency hospital with severe headache and vomiting. She was initially treated under the diagnosis of hypertensive encephalopathy. Three days later, she developed memory disturbance and disorientation. A lumbar puncture demonstrated bloody cerebrospinal fluid. She was transferred to the Atsuchi Neurosurgical Hospital with a diagnosis of subarachnoid hemorrhage.

On admission, her neurological condition was almost normal except for slight memory disturbance and disorientation. Signs of meningeal irritation was not definite. Her general medical and physical condition was good. Laboratory tests were normal except for a moderately increased white blood cell counts. She had no previous history of trauma, neurological disease, collagen disorders, and infections. The family history was not contributory.

Computed tomographic (CT) scans showed a

![Fig. 1 CT scan on admission, showing diffuse subarachnoid clot centering around the left Sylvian fissure.](Image)
diffuse subarachnoid hematoma centering around the left Sylvian fissure (Fig. 1). Left carotid angiograms revealed a large aneurysm on the ICA, and small aneurysms on the middle cerebral artery (MCA) and azygos anterior cerebral artery (ACA) (Fig. 2). Right retrograde brachial angiograms showed elongation and redundancy of the extracranial ICA at the upper cervical portion and a saccular aneurysm on the infratemporal segment (Fig. 3).

She became more stuporous and developed mild right hemiparesis and dysphasia. However, after 2 weeks she was almost alert and the hemiparesis improved. Since the left ICA aneurysm was considered to be ruptured, the left ICA and left MCA aneurysms were clipped through a left frontotemporal craniotomy. The postoperative course was uneventful, but after 1 week she became slightly obtunded due to moderate hydrocephalus, when the second operation was performed. The azygos ACA aneurysm was clipped through a small frontal interhemispheric approach and a ventriculoperitoneal shunt was placed. Postoperative angiograms demonstrated that all clips were properly placed and the three intracranial aneurysms had disappeared (Fig. 4).

Five months later, the third operation was performed. A skin incision was made from the right clavicle to the right mastoid process along the anterior margin of the right sternocleidomastoid muscle. The mandible and the right parotid gland were retracted upward. The wall of the right ICA was fragile because of its atherosclerotic changes. The right ICA was followed carefully proximally toward the skull base to expose the infratemporal aneurysm (Fig. 5 left). After temporary ICA ligation, the aneurysm was excised and the ICA reconstructed by end-to-end direct anastomosis (Fig. 5 right). Histological examination showed that the aneurysm was saccular (Fig. 6).

The postoperative course was smooth and she was discharged with minor right hemiparesis. Postoperative angiograms showed disappearance of the extracranial aneurysm and satisfactory reconstruction
Fig. 5 Intraoperative photographs of the third operation. *left:* A large aneurysm (A) and redundant right ICA (IC) are exposed at the infratemporal region. *right:* The ICA has been reconstructed with end-to-end anastomosis after the aneurysm was excised. B: skull base.

Fig. 6 *left:* Macroscopic appearance of the excised aneurysm. *right:* Photomicrograph of the aneurysmal neck. The aneurysm shows loss of the internal elastic lamina and thinning of the media. van Gieson stain, ×40.

Fig. 7 Postoperative right retrograde brachial arteriogram, showing disappearance of the extracranial aneurysm and reconstruction of the ICA.

**Discussion**

Extracranial ICA aneurysms are relatively rare vascular lesions with an incidence of 0.3–0.4%. Schechter's extensive review from 1687 to 1977 showed that the locations of cervical carotid aneurysms were: ICA 49.7%, external carotid artery 2.2%, and common carotid artery 48.1%. The coexistence of extracranial ICA aneurysm and intracranial multiple aneurysms is extremely rare. The only reported case of extra- and intracranial aneurysms had four aneurysms; two on the trifurcation of the bilateral MCAs, one on the anterior communicating artery, and the fourth on the left extracranial ICA. Despite conservative therapy, the patient died. Our case is the first to be surgically treated successfully.

The more common etiological factors for aneurysms on the cervical ICA are arteriosclerosis, congenital or developmental defects, trauma, and infection. Ionizing radiation, syphilis, and certain connective tissue disorders are more unusual. Etiological factors for intracranial aneurysms are congenital or acquired medial defects, hemodynamic stress, and atherosclerosis. The extracranial aneurysm in our case was a saccular type, so the intra- and extracranial aneurysms were probably associated.

Treatment of high cervical ICA aneurysms is controversial. Excision of the aneurysm and reconstruction of ICA is the most desirable method. However, because of the technical difficulties of operating in the infratemporal region, proximal ligation or trapping with or without extracranial-intracranial bypass has been the standard procedure. Recently, Sundt et al. achieved excellent surgical management of aneurysms of the distal extracranial ICA. In the present case, we were able to perform direct
exposure and excision of the aneurysm in the infratemporal area through a high cervical route. Reconstruction of the ICA was achieved with an end-to-end direct anastomosis without additional neurological deficit. Our experience with this unusual case has demonstrated that it is feasible to repair extracranial ICA aneurysms through a limited high cervical exposure.

References

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