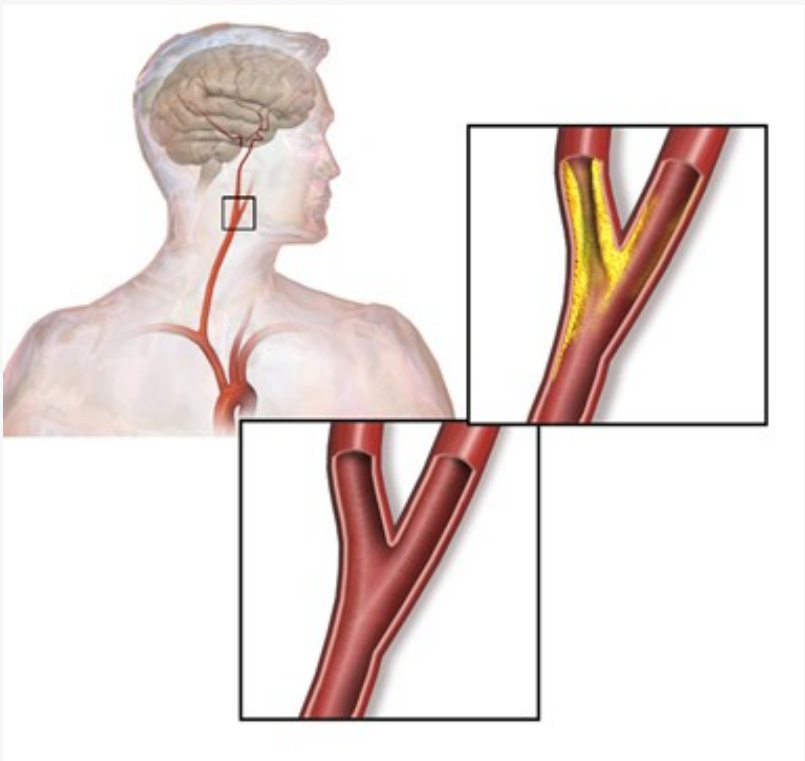
Chinese Neurosurgical Journal's Article Examines the Effects of Carotid Endarterectomy on the Blood-Brain Barrier

Surgical treatment of severe carotid artery stenosis improves cerebral blood flow and blood-brain barrier properties



Carotid artery is the blood vessel that supplies oxygen-rich blood to the brain. Stenosis of this artery leads to impaired blood flow to the brain and altered blood-brain barrier properties, which can be reversed with carotid endarterectomy.

BEIJING, CHINA, August 25, 2025 /EINPresswire.com/ -- The brain meets its nutrient and oxygen demand through blood delivered via the extensive network of blood vessels. The blood vessels of the brain have a cellular barrier called the blood-brain barrier (BBB) that selectively allows the transfer of chemicals between the brain and blood, protecting the brain against harmful substances and pathogens. Carotid arteries are important blood vessels that supply oxygen-rich blood to the brain, face, and neck. The deposition of substances, such as fat and calcium, within the walls of the carotid artery, a condition referred to as carotid artery stenosis, can lead to decreased blood flow and poor oxygen supply to the brain, increasing the risk of stroke. Carotid stenosis is treated using the surgical procedure carotid endarterectomy (CEA) in which a vessel loop is used to clear the deposition. However, whether CEA can reverse the impaired BBB in patients with severe carotid stenosis is unknown.

To address this gap, collaborative research led by Dr. Yan Zhang from the China National Clinical Research Center for Neurological Diseases examined the BBB status in patients with bilateral carotid artery stenosis before and after they underwent CEA. The study was published in the Chinese Neurosurgical Journal on 17 June 2025. Dr. Zhang states that "Given the role of BBB in cognitive functions, it is important to examine if CEA can stabilize BBB and potentially improve

long-term cognitive recovery in patients with carotid artery stenosis."

The researchers examined 17 patients with severe stenosis (≥ 70% blockage of the artery) in both carotid arteries (bilateral carotid artery stenosis) undergoing CEA. One week before CEA and several months after CEA, all patients underwent computed tomography perfusion scanning, a type of non-invasive contrast agent-based brain imaging technique, to quantify the blood flow parameters (cerebral blood flow (CBF), cerebral blood volume (CBV), mean transit time (MTT), and time to peak (TTP) and the BBB permeability parameter (permeability surface area-product (PS)).

Before CAE, the operative side (the side on which the surgery was scheduled) was characterized by decreased CBF (volume of blood delivered to the brain in a specific time), prolonged MTT (the time taken for blood to traverse the vessels), and delayed TTP (time required to achieve the highest contrast concentration in the brain) when compared with the nonoperative side. However, CBV (volume of blood in the brain) and PS (a measure of the permeability of the BBB to the contrast agent) were similar between the operative and nonoperative sides. These findings suggested that the BBB exhibited increased permeability and the cerebral hemodynamic properties were altered in patients with bilateral carotid artery stenosis. CAE reversed the enhanced BBB permeability and altered hemodynamic properties only in the operative side, decreasing CBV, MTT, TTP, and PS, but not in the non-operative side. According to Dr. Changyu Lu from Peking University International Hospital, "The non-reversal of changes in the nonoperative side may be due to the severe nature of stenosis in patients."

This research has potential implications for not only preventing stroke incidence but also improving related cognitive decline caused by impaired BBB functions in patients with carotid artery stenosis.

***

Reference
Title of original paper: Carotid endarterectomy and blood-brain barrier permeability in subjects with bilateral carotid artery stenosis
Journal: Chinese Neurosurgical Journal
DOI: 10.1186/s41016-025-00398-3

About China National Clinical Research Center for Neurological Diseases
The China National Clinical Research Center for Neurological Diseases is based at the Beijing Tiantan Hospital, affiliated with the Capital Medical University. In August 2013, the establishment of NCRC-ND was formally approved by the Ministry of Science and Technology of the People's Republic of China, National Health Commission of the People's Republic of China, the Ministry of Health of the General Logistics Department of the People's Liberation Army, and the former China Food and Drug Administration. It is also the first clinical medical research center for neurological diseases identified.

Website: https://ncrcnd.org.cn/English/

Funding information
This work was supported by the Capital Health Research and Development of Special Fund (2024–2-1072).

Yi Lu
Chinese Neurosurgical Journal
1059978478 ext.
email us here