Spontaneous cervical internal carotid artery vasospasm

Case report and literature review

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Internal carotid artery (ICA) vasospasm can be caused by mechanical manipulation¹ or drugs² or in association with migraines.³ Recurrent spontaneous ICA vasospasm is a rare cause of stroke. We report a case of recurrent TIA caused by alternating cervical ICA spasms. We also performed a MEDLINE search of previous publications in English from 1950 to August 2013. The search was performed with both text word searching and the appropriate MeSH headings of “carotid vasospasm” and “stroke,” “cerebrovascular accident,” “TIA,” or “brain attack.” The bibliographies of each of the retrieved articles with similar cases were all reviewed and relevant citations in these listings were evaluated for inclusion in the review.

Case report

A 55-year-old woman was admitted to the hospital with 4 episodes of transient right-sided hemiparesis and aphasia lasting 10–15 minutes each. She noted several occurrences of unilateral right or left numbness and tingling of her face, arms, and legs over the last 30 years. These episodes typically lasted for 5–10 minutes with spontaneous resolution. Her medical history was notable for hyperlipidemia, non-ST elevation myocardial infarction, and idiopathic congestive heart failure. She had an active 40-pack-year smoking history but reported no alcohol use, oral contraceptive use, or migraines. Family history was notable for coronary artery disease, ischemic stroke, and myocardial infarction.

Neurologic examination of her cranial nerves and sensory and motor examinations had normal results. Routine rheumatologic laboratories had normal results. Brain MRI showed multiple areas of nonspecific subcortical white matter changes in internal watershed distribution (figure, D). Magnetic resonance angiography (MRA) of head and neck revealed a high-grade stenosis of the right ICA 2 cm distal to the carotid bifurcation. Right high-grade stenosis was also confirmed by CT angiography (figure, C). Due to prior left-sided TIA symptoms, the patient was scheduled for a right ICA stent placement. However, her conventional angiography showed left ICA occlusion and minimal distal right ICA stenosis (figure, E and F). Therefore, no stent was placed. A repeat MRA of the head and neck showed no occlusion but moderate submandibular stenosis of the left cervical ICA. In the setting of reversible ICA stenosis, we made the diagnosis of alternating ICA vasospasm.

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Figure Imaging

Initial head (A) and neck (B) magnetic resonance angiography shows right internal carotid artery (ICA) stenosis (white arrow) confirmed by CT angiography (C). (D) Fluid-attenuated inversion recovery sequence shows ischemic white matter changes in subcortical watershed distribution. Conventional angiography shows left ICA occlusion (E, F, black arrow).

The patient was treated with aspirin, long-acting nitrate, and a tapering course of prednisone. A month later, repeat MRA head and neck imaging showed complete resolution of ICA stenosis. In a 12-month follow-up period, she continued to have TIAs (approximately 7 episodes of left-sided hemiparesis and paresthesias).

Our PubMed search found 11 articles comprising 12 cases. All patients had confirmed recurrent alternating cervical ICA vasospasm with the exception of 1 fatal case with no follow-up. The average age at presentation was 32 years. Patients were usually female (69%) and had a history of migraines before developing focal neurologic deficits. The most commonly reported brain imaging finding was watershed infarct (table).

DISCUSSION

Spontaneous ICA vasospasm is a rare phenomenon and can go unnoticed if imaging studies are delayed or not repeated. Despite her other vascular risk factors, our patient compares with previous cases of alternating ICA vasospasm reported in the literature (table). These patients usually develop new-onset focal neurologic symptoms at age 20–30 years. Many of them have a history of migraines. Focal neurologic symptoms are numerous, and they can alternate from right to left. Because vasospasms may occur without triggers, it is important to have a high clinical suspicion. A characteristic feature is recurrent alternating cervical carotid stenosis. The stenosis resembles a segmental filiform narrowing or a distal carotid bulb near occlusion that usually resolves spontaneously after 24–72 hours. Some cases may be misdiagnosed as carotid dissection; others are not detected if imaging does not capture vasospasm during the acute event. In order to differentiate from carotid dissection, we recommend follow-up with extracranial vascular imaging studies.

The etiology of vasospasm causing alternating carotid vasoconstriction remains unclear. A selective overexpression of sympathetic nerve terminals or vasomotor receptors in the intermediate ICA segment has been suggested as a possible mechanism.⁴ However, blockage of the stellate sympathetic ganglia has only temporarily ceased the carotid spasms.⁵

Table Cases of alternating internal carotid artery vasospasm reported in the literature

Reference	Age, y ^a /sex	Presentation	History of migraine	Recurrence	Location of vascular abnormalities	Location of ischemic lesions	Treatment
6	27/F	Hemiparesis, hemisensory loss, apraxia	Yes	Yes	Segmental at C1 vertebral level and 2 cm above carotid bulb	Bilateral subcortical/cortical parietotemporal hypodensities	Steroids, verapamil
7	32/F	HA, aphasia, hemiparesis, visual disturbances	Yes	Yes	4 cm above the bifurcation	Subcortical parietal region	Steroids
8	37/F	HA, fainting spell	Yes	Yes	Above bifurcation	MCA territory	Not reported
9	30/M	HA, hemiparesis	Yes	Yes	Cervical ICA	MCA territory	Steroids
9	48/F	HA, hemiparesis	Yes	Yes	Cervical ICA	Basal ganglia	Flunarizine, steroids
5	20/M	Hemiparesis, visual disturbances	Yes	Yes	Submandibular ICA	Subcortical WM	Stellar ganglion anesthesia
10	45/M	Monocular visual loss	Yes	Yes	Cervical ICA	Not reported	Nitroglycerin, flunarizine, Coumadin
11	20/F	Paresthesias	Yes	Yes	Cervical ICA at origin	Non specific bilateral WMH	ASA
12	36/F	Monocular visual loss, hemiparesis	No	Yes	Segmental stenosis	Subcortical WM watershed	Calcium channel blockers, ASA, cilostazol, doxazosin
4	15/M	Monocular visual loss, hemiparesis	Not reported	Yes	2 cm above carotid bulb and below skull	Subcortical WM watershed	Prazosin
13	24/F	Visual loss, HA, hemiparesis, hemisensory loss	No	Yes	4 cm above the origin of the ICA	Subcortical WM watershed	Calcium channel blockers and antiplatelets
14 ^b	67/F	Quadriparesis	No	No	Submandibular ICA	Bilateral subcortical watershed WM	Dexamethasone
Huisa, current case	20s/F	Hemiparesis, dysarthria	No	Yes	Submandibular ICA	Subcortical WM watershed	Calcium channel blockers

Abbreviations: ASA = acetylsalicylic acid; HA = headache; ICA = internal carotid artery; MCA = middle cerebral artery; WM = white matter.

^aOnset of focal neurologic symptoms.

^bFatal case.

Currently, no standardized treatment for ICA vasospasms exists. Anticoagulation, calcium channel antagonists, corticosteroid therapy, and α -blockers have been used, with variable outcomes.

Vasospasm of ICAs should be considered in young patients with recurring alternating ischemic events in the absence of any other explanation or inconsistent vascular imaging studies.

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