

Vidian Artery as a Collateral Channel Between the External and Occluded Internal Carotid Arteries

—Case Report—

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Abstract

A 68-year-old man presented with occlusion of the internal carotid artery (ICA) manifesting as a 6-month history of progressive sensory and motor disturbance of the left lower limb. Angiography clearly demonstrated a collateral arterial network between the ICA and external carotid artery (ECA) through the vidian artery, a small branch of both the ICA and ECA. The vidian artery may form an unusual but important ECA-ICA collateral pathway in patients with occlusive lesion of the ICA.

Key words: vidian artery

Introduction

The vidian artery arises from the petrous segment of the internal carotid artery (ICA) and anastomoses with a corresponding branch of the internal maxillary artery and the ascending pharyngeal artery of the external carotid artery (ECA). The vidian artery is rare in adults, and is usually identified in children with vascular mass in the nasopharynx. The ophthalmic artery is the most common collateral pathway between the ICA and ECA in patients with ICA occlusion.

Here we describe a rare case of the vidian artery acting as a collateral channel from the external carotid system to reconstruct the petrous ICA segment.

Case Report

A 68-year-old man presented with a 6-month history of progressive sensory and motor disturbance of the left lower limb. He had a past history of hypertension persisting for 10 years. On admission, vascular bruit was heard in the right side of the neck. Neurological examination revealed mild weakness and hypesthesia of the left lower extremity. Magnetic resonance imaging revealed a deep watershed infarction in the right cerebral white matter. Single photon emission computed tomography

Received August 31, 2004; Accepted February 21, 2005

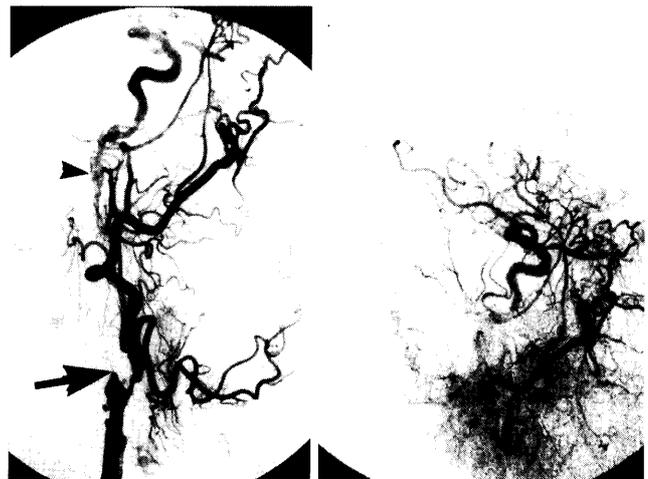


Fig. 1 Right common carotid angiograms (left: early arterial phase, right: late arterial phase), lateral view, showing the right internal carotid artery was completely occluded (arrow) at its origin, but was reconstructed at the petrous segment (arrowhead) by the collateral blood supply from the ipsilateral external carotid artery.

demonstrated decreased cerebral blood flow and hemodynamic impairment (on acetazolamide challenge) in the bilateral middle cerebral artery territories. Angiography disclosed complete occlusion of the origin of the right ICA and severe stenoses at the origins of both the right ECA and left ICA (Fig. 1). The petrous segment of the right ICA was supplied by a collateral network from the ECA branch. The left anterior oblique view of right



Fig. 2 Right common carotid angiogram, left anterior oblique view, showing the collateral blood flow to the petrous internal carotid artery was supplied by the ascending pharyngeal artery via the vidian artery (arrow).

carotid angiography revealed that the ascending pharyngeal artery anastomosed with the vidian artery arising from the ipsilateral ICA petrous segment (Fig. 2). The ipsilateral middle and anterior cerebral arteries were both supplied from the ipsilateral ICA and across the anterior communicating artery via the contralateral carotid system.

The patient underwent uneventful percutaneous angioplasty and stenting of the left ICA origin and endarterectomy of the right ECA. The symptoms improved after treatment.

Discussion

The vidian artery usually arises within the pterygopalatine fossa as a branch of the distal maxillary artery, but arose from the inferior aspect of the ICA within the petrous temporal bone in 30% of anatomic specimens.⁶⁾ The vidian artery passes into the pterygoid canal, and anastomoses with a posteriorly directed branch of the maxillary artery.²⁾ The stages of embryological development can explain the variations in the course and anastomotic patterns of this artery. At the 4 to 5 mm fetal stage, the first aortic arch regresses and the remnants form the primitive mandibular artery. By the 7 to 12 mm fetal stage, the primitive mandibular artery usually disappears and the vidian artery develops from part of the mandibular plexus remnant. If the primitive

mandibular artery regresses normally, the vidian artery will arise from the definitive maxillary artery. If the proximal primitive mandibular artery persists, the vidian artery will arise directly from the ICA. If incomplete regression or only partial involution of the first aortic arch occurs, the vessel will extend from the maxillary artery through the pterygoid canal all the way to the petrous ICA.⁵⁾

Regardless of the origin, the vidian artery participates in two major vascular networks through anastomoses in the pterygopalatine fossa and oropharyngeal mucosa.⁵⁾ The first network is formed between the pharyngeal, ethmoidal, and sphenopalatine arteries through the pterygopalatine segment of the maxillary artery. The second complex anastomotic network is located in the highly vascular nasopharyngeal mucosa. The vidian artery anastomoses with rami of the ascending pharyngeal and accessory meningeal arteries in the oropharynx and around the eustachian tube.¹⁻⁴⁾ These embryological and anatomical characteristics of the vidian artery explain its involvement in a variety of pathological processes such as dural arteriovenous fistula (dural carotid cavernous fistula), vascular malformation, vascular tumor, and even epistaxis. Embolization of the ECA branches may result in incomplete obliteration of vascular nasopharyngeal tumor in the presence of this artery. Furthermore, this vessel may act as an important collateral channel in cases of ICA occlusion. Collateral blood flow may be supplied from either the pterygopalatine network (distal maxillary artery) or the oropharyngeal network (ascending pharyngeal artery), as in this case.

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