External Carotid Origin of the Dominant Vertebral Artery

Case Report

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The existence of carotid basilar anastomoses has been well documented embryologically,\(^2\) anatomically,\(^3\) and, in the case of the persistent trigeminal\(^5\) and persistent hypoglossal\(^6\) arteries, angiographically. Whereas the vertebral artery customarily arises from the first part of the subclavian artery, it has been reported to arise directly from the aorta and from the inferior thyroid artery.\(^4\)

During the course of angiographic evaluation of a patient with a subarachnoid hemorrhage, an aneurysm of the right internal carotid artery at the level of the origin of the posterior communicating artery was demonstrated by a right retrograde brachial injection. A hypoplastic right vertebral artery was visualized but there was no opacification of the basilar artery (Fig. 1). When the left common carotid artery was injected, the posterior circulation was densely opacified through a left vertebral artery that originated from the external carotid artery trunk at the level of the third cervical vertebra. This aberrant vertebral artery then passed upward and posteriorly, presumably entering the transverse foramen of the second cervical vertebra, and pursued the course of a normal but enlarged vertebral artery cephalad. A small saccular aneurysm of the left internal carotid artery was noted at the origin of the left posterior communicating artery (Fig. 2).

We have found no report of a dominant vertebral artery that originated from the external carotid artery.

In the course of the surgical treatment of certain aneurysms, arteriovenous malformations, and carotid cavernous fistulae, the necessity of ligating a common carotid artery or its external or internal branch arises. Because of the possibility of various anomalies, it is essential to demonstrate the anatomical arrangement of the major vessels to the brain before undertaking such surgery. Common carotid ligation in the present case would have resulted in serious compromise of the posterior circulation.

Summary

We have reported a case in which an abnormal origin of the dominant vertebral artery from the left external carotid artery was demonstrated by a preoperative angiogram. The effect of carotid ligation under this circumstance is obvious. We have emphasized the importance of accurate knowledge of the specific anatomical arrangement of vessels supplying blood to the brain prior to ligation of a major cervical vessel.

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Fig. 1. Right brachial angiogram, lateral view, showing the hypoplastic right vertebral artery and saccular aneurysm of the internal carotid artery at the origin of posterior communicating artery.
Fig. 2. Left common carotid angiogram, lateral view (left), frontal view (center), and lateral oblique view (right), showing the left vertebral artery arising from the left external carotid artery trunk and a 3 mm saccular aneurysm of the left internal carotid artery at the origin of the posterior communicating artery.

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References