Type 2 Proatlantal Artery Associated with a Ruptured Aneurysm
—Case Report—

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Abstract
A rare case of a type 2 proatlantal artery discovered following the rupture of a cerebral aneurysm in a 74-year-old female is reported. The aneurysm was clipped and the hematoma removed, but she died of severe vasospasm 9 days after surgery. The anomalous artery was thought to have been unrelated to rupture of the aneurysm.

Key words: type 2 proatlantal artery, carotid-vertebral anastomosis, aneurysm rupture

Introduction
The type 2 proatlantal artery named by Lasjaunias et al. is a rare persistent artery of the carotid-vertebral embryonic channel. It arises from the external carotid artery, runs posteriorly to join the vertebral artery, then passes through the transverse foramen of the C1 segment. An anteroposterior view through the open mouth is useful in differentiating the type 2 from the type 1 artery arising from the external carotid artery. Since a type 2 proatlantal artery is usually accompanied by aplasia or hypoplasia of the vertebral arteries, it contributes substantially to the posterior circulation. Four cases have been previously reported. We present a case of a type 2 proatlantal artery associated with a ruptured cerebral aneurysm.

Case Report
On May 10, 1989, a 74-year-old female was brought to our hospital after suddenly losing consciousness. On admission she was comatose and her right pupil was dilated and only slightly reactive to light. Babinski’s reflex was positive bilaterally.

A computed tomographic (CT) scan showed severe subarachnoid hemorrhage and an intracerebral hematoma in the right temporal lobe (Fig. 1). A right carotid angiogram disclosed an aneurysm at the middle cerebral artery trifurcation (Fig. 2). In addition, a large, anastomotic vessel arising from the external carotid artery was observed. This vessel extended posteriorly, joined the vertebral artery under the C1 vertebra, and passed through the transverse foramen of the C1 (Figs. 2 and 3). An arch aortogram showed aplasia of the right vertebral ar-

Fig. 1 CT scan revealing severe subarachnoid hemorrhage in the basal cistern and an intracerebral hematoma in the right temporal lobe.
tery and hypoplasia of the left vertebral artery (Fig. 4). The left vertebral artery terminated in the posterior inferior cerebellar artery.

After diagnosis of a ruptured aneurysm, she underwent a right frontotemporal craniotomy during which aneurysmal neck clipping was performed and the hematoma was removed. Postoperatively she regained consciousness but was agitated and confused and died of severe vasospasm on the 9th postoperative day.

**Discussion**

Persistence of an embryonic carotid-vertebral anastomosis is very rare — much rarer than persistence of carotid-basilar anastomosis. Being asymptomatic, this type of anomaly is generally discovered incidentally. Padget\(^8\) and Lasjaunias *et al.*\(^3\) identified and named these vessels, but little of their terminology is still used. In our case, the large, anomalous vessel arose from the external carotid artery and extended posteriorly, connected with the third segment of the vertebral artery under the C1 vertebra, and passed through the transverse foramen of the C1. This vessel would be classified as a type 2 proatlantal artery according to Lasjaunias and colleagues\(^5\) and as a persistent first cervical intersegmental artery according to Padget.\(^8\) Lasjaunias *et al.* reported that, in contrast to the type 2 proatlantal artery, the type 1 artery arises from the internal or external carotid artery and joins the fourth segment of the vertebral artery in the occipitoatlantal (proatlantal) space. This vessel does not pass through the transverse foramen of the C1, and therefore was termed “persistent proatlantal intersegmental artery” by...
Lasjaunias et al. advanced the interesting hypothesis that the occipital and type 1 proatlantal arteries arise from the external carotid artery, and Suzuki et al. support this theory. Obayashi and Furuse noted that the anteroposterior view is useful in differentiating the type 2 from the type 1 artery arising from the external carotid artery. From this perspective, it is evident that the former passes through the transverse foramen of the C1 and the latter ascends laterally to the transverse process of the C1. We feel, however, that an anteroposterior view through the open mouth is more useful for differentiation because this view can make it easy to identify the vessel which passes through the transverse foramen of the C1.

Sato et al. reviewed seven reported cases of the type 2 proatlantal artery, as well as one of their own. The anomalous vessels reported by Obayashi and Furuse and by Legre et al. did not pass through the transverse foramen of the C1. Also, the courses of the vessels reported by Hackett and Wilson and by Tsai et al. were not mentioned. Thus, only five cases of the type 2 proatlantal artery, including our own, have been described in detail.

Bilateral vertebral angiography was performed in all cases except that reported by Murayama et al. The angiograms in these four cases unanimously showed the ipsilateral vertebral arteries to be aplastic and the contralateral vertebral arteries to be hypoplastic, terminating in the posterior inferior cerebellar artery. Consequently, the posterior circulation depended primarily on the type 2 proatlantal artery. Although this suggests that occlusion of this vessel could easily result in ischemia of the vertebrobasilar system, no such case has been reported. A single case was reported in which vertebrobasilar transient ischemic attacks were caused by an ulcerative lesion of the internal carotid artery, which merged with a type 1 proatlantal artery. However, ischemia is unlikely to occur through this mechanism in cases of type 2 proatlantal artery because this vessel arises from the external carotid artery.

Ours is the first reported case of a type 2 proatlantal artery associated with a cerebral aneurysm. However, unlike a persistent hypoglossal artery, this vessel itself does not develop cerebral aneurysms because it joins the vertebral artery extracranially. In our case, the anomalous artery and the cerebral aneurysm were apparently coincidental, and we do not regard the presence of this vessel as signifying a potential catastrophe.

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References


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