Angiographic Demonstration of Blood Supply to the Tentorium
Case Report and Review of the Literature

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The anterior, middle, and posterior meningeal arteries form the blood supply of the dura. They are branches of the external and internal carotid, and the vertebral arteries. There are many anastomoses between the main trunks and their branches. Some connections also exist between branches of the pericallosal artery and the arteries of the falx cerebri.

Izmailova1 studied 67 human head preparations from cadavers of persons of both sexes, their ages ranging from newborn to 61 years. She was able to demonstrate 16 permanent and 2 non-permanent pairs of arteries supplying the dura, the falx, and the tentorium. Some of these vessels had not been previously described and the origins of certain arteries were not well understood before her studies. She was the first to demonstrate the 2 arteries which are the main blood supply of the tentorium. They arise from the internal carotid artery. She named these arteries anterior and posterior trunks. The anterior trunk originates from the last sinusity of the cavernous portion of the internal carotid artery and divides immediately into 3 branches. The ophthalmic branch courses anteriorly entering the orbital fossa through the superior orbital fissure, and anastomoses with branches of the ophthalmic artery. The second, the artery of the greater wing of the sphenoid, is divided into several branches serving that region. The third branch is the artery of the Gasserian ganglion. It runs more posteriorly and gives off small vessels to the dura at the base of the middle fossa, as well as to the Gasserian ganglion.

The posterior trunk is a branch of the dorsal part of the internal carotid artery at the level of its 4th sinusity, and usually divides into 3, sometimes 2 or 4, branches. Two of these are small and supply the clivus, the hypophysis, and the diaphragma sellae. The 3rd branch is the longest and the largest (0.6–0.8 mm. in diameter) and runs posteriorly to enter the 2 leaves of the tentorium at its free margin. Izmailova named this the medial superficial cerebellar artery. She also demonstrated another smaller posterior artery, arising from the posterior trunk in 23 cases, from the medial superficial cerebellar artery in 11, and from the internal carotid artery itself in 13. In 9 preparations the medial superficial cerebellar artery originated from the lacrimal artery and entered the cranial cavity through the superior orbital fissure together with the trochlear nerve. Izmailova also demonstrated the existence of what she called the anterior and posterior arteries of the falx. These are branches of the pericallosal artery and the posterior one anastomoses with the tentorial arteries.

This study2 apparently remained unknown to the western world. In 1936 Bernasconi and Cassinari3 reported the angiographic demonstration of a “peculiar” artery, “not described in the literature,” in 5 cases of tentorial meningioma. In lateral projections this artery was well demonstrated in 8 cases. It was seen passing over the carotid siphon and dorsum sellae in a backward direction, parallel to the base of the mastoid. More posteriorly the artery showed an anterior concavity, feeding the meningioma. Bernasconi and Cassinari were in doubt about the origin of the artery, but thought that it probably was a branch of the external carotid. In the following years similar cases appeared in the literature.4,5,7

Schnürrer and Stattin6 reported their anatomic studies of the tentorial branches of the cavernous internal carotid in 15 specimens. They described the same 2 main arteries which Izmailova called the posterior and anterior trunks, and referred to them as dorsal and lateral main stems respectively. They called the one which runs along the free edge of the tentorium the “marginal tentorial branch.” In their specimens this branch arose from the anterior trunk although in Izmailova’s series this branch generally came off the posterior trunk. In some preparations they could follow this artery to “the summit of the tentorium and in one case the vessel could be seen to pass over the basal portion of the falx.” This finding is in accordance with Izmailova’s statement about anastomoses between the posterior branches from the pericallosal artery and the tentorial artery. Frugoni et al.3 demonstrated this same phenomenon angiographically in 2 cases of meningioma.

Cortes et al.7 have recently demonstrated that this artery can be visualized in pathologi-
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Fig. 1. Right common carotid angiography; antero-posterior view. There is a shift of the pericallosal artery to the left. Abnormal tumor vessels above the bifurcation of the internal carotid were clearly seen in the original x-rays, but are not well demonstrated in the reproduction.

Surgical conditions other than the tentorial meningiomas. They have reported on 1 case of glioblastoma infiltrating the tentorium and 3 cases of arteriovenous malformations close to the tentorium. In all of these, this artery was large enough to be visualized in angiograms and could be followed posteriorly along the free edge of the tentorium to the site of the pathological process.

Case Report

S.M. (1968/5045) was a 40-year-old man who was admitted with symptoms of increased intracranial pressure. He gave a history of a slight head injury which had occurred 6 months before admission. Soon after the trauma, he began to have slight intermittent headaches which later became more intense. He had nausea and vomiting which also gradually increased in intensity. He did not complain of visual disturbance.
Examination. He was restless, uncooperative, and stuporous. He could talk slowly but was sometimes incoherent. He had bilateral papilledema and muscle weakness on the left side. The Babinski sign was positive on both sides. Right common carotid angiography was performed. This showed a space-occupying lesion in the posterior fossa, with an abnormally large branch from the cavernous portion of the internal carotid artery feeding the mass. The tumor vessels were arranged in a “sunburst” fashion (Figs. 1 and 2). The patient’s condition deteriorated and he died approximately 6 hours after the angiographic examination.

At autopsy, which was confined to the examination of the brain, a spherical mass of approximately 6 cm. in diameter was found above the tentorium on the right side, indenting the inferior surface of the temporo-occipital region. The mass was attached to the tentorium with a narrow and short stalk. There was uncal herniation on the right side and the right cerebral hemisphere was slightly herniated. Microscopic diagnosis of the tumor was meningioma.

Angiographic Findings
The antero-posterior angiogram shows slight...
deviation of the pericallosal artery to the left of the midline. Abnormal tumor vessels in a radiating pattern are most clearly visible above the bifurcation of the internal carotid artery (Fig. 1). In the lateral projection there is a “sunburst” appearance of the tumor vessels at the posterior aspect of the mastoid cells. A relatively large artery coming off the cavernous portion of the internal carotid artery is directed posteriorly and crosses the petrous bone to enter the base of the tumor mass. This artery is identical with Izmailova’s medial superficial cerebellar artery or Schnürer and Stattin’s marginal tentorial artery (Fig. 2).

Another larger vessel just below this artery is also present, coursing posteriorly and almost parallel to it. Slight obliquity of the head demonstrates this vessel. It was identified as one of the posterior branches of the middle meningeal artery and also contributed to the blood supply of the tumor.

Summary

We have reviewed reports concerning the blood supply of the tentorium from the cavernous portion of the internal carotid artery and have reported a case of supratentorial meningioma with angiographic demonstration of a vessel coming off that part of the carotid artery and feeding the tumor.

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References