Hemangioblastomas with Blood Supply from the Dural Arteries
—Two Case Reports—

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Abstract

Hemangioblastomas are benign vascular tumors that often occur in the cerebellum, and are located near the pia mater. The blood supply is usually received through the pia mater, and rarely through the external carotid artery. The present cases of hemangioblastoma received blood supply from the external carotid artery (occipital artery) and a branch of the internal carotid artery (carotico-typanic artery or artery of Bernasconi Cassinari) through the dural branches. The dural arteries were not the main feeders in either case, but preoperative embolization of the occipital artery contributed to minimum bleeding during the operation in one case. Incomplete resection of hemangioblastoma is related to multicentricity of the tumors, small mural nodules, or brain stem involvement. Angiography is valuable for demonstrating arterial supply to small or multiple mural nodules. Conventional angiography is necessary for investigation of the external carotid artery branches.

Key words: hemangioblastoma, angiography, carotid artery, dural artery

Introduction

Hemangioblastoma of the brain accounts for about 1.1% to 2.4% of all central nervous system tumors, and about 7% of posterior cranial fossa tumors. Hemangioblastomas occur exclusively in the posterior fossa, especially in the cerebellum. Angiography is the most useful method to identify blood supply to small or multiple mural nodules that may not be detected by computed tomography (CT) or magnetic resonance (MR) imaging. Vertebral angiography is usually performed for cerebellar hemangioblastoma without investigation of the external carotid artery (ECA), because hemangioblastoma is a benign intramedullary tumor. The nodule of the tumor is almost always in contact with the pia mater. Investigation of blood supply from the dural arteries to cerebellar hemangioblastomas has concluded that the dural artery is not a main feeder for the tumors. However, conventional angiography is still necessary to detect the exact tumor location, size, and multicentricity.

Case Reports

Case 1: A 52-year-old female had suffered from poor balance since May 1990. She was admitted to our hospital with a history of nausea, dizziness, and gait disturbance in November 1990. Head CT demonstrated hydrocephalus associated with a large enhanced solid tumor in the cerebellar vermis and hemisphere (Fig. 1A, B). T1-weighted MR imaging showed that the tumor was well circumscribed with variable intensities inside the mass, which was diffusely enhanced by gadolinium-dimeglumine (Gd) (Fig. 1C, D). Hemangioblastoma was the most likely diagnosis, but neither retinal hemangioma nor polycythemia could be excluded. Initially ven-

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Fig. 1 Case 1. A, B: Computed tomography scans, (A) showing hydrocephalus, and (B) with contrast medium demonstrating a huge homogeneously enhanced mass in the cerebellum. C, D: T1-weighted magnetic resonance images, (C) showing a tumor with heterogeneous intensities, and (D) showing the well-demarcated cerebellar mass with homogeneous enhancement by gadolinium dimeglumine.

triculoperitoneal shunt was performed to ameliorate her symptoms. Vertebral angiography in December 1990 showed blood supply to the tumor from both the superior cerebellar artery (SCA) and posterior inferior cerebellar artery (Fig. 2 upper row). Selective left occipital artery angiography also revealed tumor staining (Fig. 2 lower row).

Embolization of the left occipital artery was performed on the day before tumor resection because of the high vascularization. The patient was placed in the supine position under general anesthesia. A linear skin incision was made from 3 cm above the inion to the 4th cervical level. During dural opening, a dural artery was recognized which was attached to the bone, penetrated the arachnoid, and entered the tumor. The tumor was totally removed. The histological diagnosis was hemangioblastoma (Fig. 3).

The postoperative course was uneventful and she was discharged without complaints at the end of February 1991.

Case 2: A 67-year-old male with a one-month history of dizziness and gait disturbance came to our hospital in May 1993. CT revealed an enhanced solid mass in the left cerebellar hemisphere (Fig. 4A, B). T2-weighted MR imaging showed the lesion as a heterogeneous mass, which was enhanced
homogeneously by Gd (Fig. 4C, D). T₂-weighted MR imaging demonstrated the left cerebellar tumor and shift of the fourth ventricle to the right caused by severe peritumoral edema (Fig. 4E). Ophthalmologic examination found no retinal hemangioma. Laboratory data did not show polycythemia, and all tumor markers for metastatic brain tumor were within the normal ranges. Vertebral angiography showed tumor staining mainly fed by left posterior inferior cerebellar artery (Fig. 5 left). Another blood supply was recognized from a branch of the internal carotid artery (ICA), the carotico-tympanic artery or artery of Bernasconi Cassinari (Fig. 5 right).

Total resection of the tumor was performed in the right lateral position in June 1993. There was no adhesion of the tumor to the dura mater, but the tentorial artery was sacrificed because of its blood supply to the tumor. Histological examination found stromal cells and endothelial cells with a network of capillaries, which are typical features of hemangioblastoma⁶⁸ (Fig. 6).

Postoperatively his symptoms gradually improved. He was discharged without nausea or dizziness in July 1993.

Discussion

Blood supply to an intraaxial tumor from the dural arteries may occur due to tumor invasion of the dura mater, previous minor bleeding over the pia mater which causes adhesion of the tumor to the dura mater, extraaxial origin of the tumor with greatest growth of the mass occurring intraaxially, or recurrence of tumor after surgical resection. In our two cases, the tumors were solid, growing superficially, and the dural arteries were not the main feeders.

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Spontaneous bleeding from the tumors occasionally occurs, but no minor bleeding was recognized in our cases. The dural artery purely went into the mural nodule penetrating the pia mater.

The main cause of recurrence of hemangioblastoma is incomplete tumor resection because of multicentricity, small mural nodule, or brain stem involvement. Complete tumor resection required information about the exact tumor size, location, and multicentricity. Conventional angiography can detect small and multiple nodules which cannot be identified by CT or MR imaging. Conventional angiography can be very useful, especially for detection of any dural arterial blood supply to the hemangioblastoma.

The dural arteries supplying the hemangioblastomas in our cases were the occipital artery originating from the ECA and the dural artery originating from the ICA. Dural arteries cannot act as the main feeder for hemangioblastomas, but presurgical embolization of the enlarged occipital artery minimized intraoperative bleeding in one of our cases. Embolization is not always necessary for the tumor resection, however, embolization of a dural artery is much easier and safer than that of a pial artery, because the latter may cause cerebral or cerebellar infarction and result in neurological deficits. Angiography for cerebellar hemangioblastomas usually involves examination of the vertebral artery, but the present cases suggest that the investigation of ICA and ECA is also required.

References


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