Cavernous Angioma of the Corpus Callosum Mimicking an Astrocytic Tumor

—Case Report—

Shunichi HARADA, Maki NIIMI, Kenichi MURAKAMI, and Tsuneo NAKAMURA

Department of Neurosurgery, Saiseikai Kanagawaken Hospital, Yokohama

Abstract

A 49-year-old female presented with a mass at the genu of corpus callosum manifesting as vertiginous sensation persisting for a couple of months. The preoperative diagnosis based on neuroimaging was astrocytic tumor, probably an oligodendroglioma. The mass was totally excised through a left interhemispheric approach without postoperative neurological deficits. Histological examination of the mass revealed only vascular components with tiny hemorrhage, compatible with cavernous angioma. Cavernous angioma at the genu of corpus callosum is very rare, and definitive diagnosis can be achieved only through surgery. Surgical intervention should be considered before starting radiotherapy without histological confirmation.

Key words: cavernous angioma, corpus callosum, magnetic resonance imaging

Introduction

Cavernous angioma may occur in any part of the cerebral parenchyma including the brain stem, the cerebellum, the mid brain, and the adjacent tissues. Cavernous angioma is a vascular tumor, so may manifest clinically as stroke, fatal hemorrhage, convulsive seizures, apoplexy due to bleeding from the tumor, and neurological deterioration corresponding to the location of the tumor, but many cases of cavernous angioma are found incidentally as an asymptomatic and silent mass by computed tomography (CT) or magnetic resonance (MR) imaging of the brain. Cavernous angiomas most commonly occur in the supratentorium, the cerebral subcortex, and the basal ganglia, but were also detected in the pineal region,⁹⁾ the optic nerve, the middle fossa, the cavernous sinus,¹⁵⁾ and the ventricular system.¹⁰⁾ Treatment of intracerebral lesion requires selection from several options including radiotherapy or gamma knife surgery, but surgery will provide the definitive diagnosis and complete disappearance of the mass. Here, we describe a cavernous angioma at the corpus callosum which was at first suspected of being a glial tumor, and was successfully excised through surgery.

Case Report

A 49-year-old female presented with vertiginous sensation persisting for a couple of months. The initial diagnosis was autonomic disturbance and she was treated medically but showed no sign of improvement. Whole brain CT detected an isodense, solid, irregular spherical mass containing a high density area on the genu of corpus callosum extending between the anterior horns of the bilateral lateral ventricles. The initial impression of glial tumor now became oligodendroglioma (Fig. 1). CT with contrast medium showed little or no enhancement in or around the mass. Sagittal T₁-weighted MR imaging with contrast medium showed irregular enhancement within the mass (Fig. 2). T₂-weighted MR imaging showed a very low intensity area which corresponded to the high intensity area on the T₁-weighted MR image. There was no high intensity area in the surrounding tissue of the tumor, presumably indicating absence of perifocal edema (Fig. 3). Cerebral angiography demonstrated no abnormal staining or vascular deviation around the mass.

The patient underwent bifrontal craniotomy through the left interhemispheric approach to develop the operative field into the genu of the corpus

Received December 12, 2000; Accepted May 10, 2001

Author's present address: S. Harada, M.D., Department of Neurosurgery, Fujita Health University, Toyoake, Aichi, Japan.

Fig. 1 Computed tomography scans showing an irregular, round isodense mass containing high density fragments (left), which was not enhanced by contrast medium (right).

Fig. 2 Axial T₁-weighted magnetic resonance images showing a rather hypointense mass at the genu of corpus callosum located between the anterior horns of the bilateral lateral ventricles (left), with irregular enhancement after gadolinium administration (center, right).

Fig. 3 Axial T₂-weighted magnetic resonance images showing a hypointense mass without signs of brain edema.

Fig. 4 Photomicrograph of the specimen showing thin endothelium filled with red blood cells. The vasculature is separated by fibrous, hyalinized connective tissue. No brain tissue is seen between the dilated vasculatures. Hemosiderin deposits are present around the tumor. HE stain, $\times 100$.

callosum. The surface of the corpus callosum was very smooth and was partially resected to expose the mass. The mass was pinkish-gray, elastic soft, and had a sharp margin, so could be easily separated from the surrounding tissue without bleeding. The lesion was a multilobulated mass with fibrous and hyalinized connective tissue mainly composed of dilated vasculature, filled with red blood cells. The endothelial cells were thin and monolayered in varying sizes, indistinguishable from those of veins and arteries. Hemosiderin deposits were also seen both within the tumor and in the surrounding brain tissue suggesting previous hemorrhage (Fig. 4).

Discussion

Cavernous angioma at the genu of corpus callosum is extremely rare as an symptomatic lesion. Analysis of previously reported cases of cavernous malformations suggests that the severity of a lesion is related to the size and frequency of hemorrhage.⁸⁾ The lesion in our case was small with no evidence of hemorrhage through preoperative neuroimaging and at operation. Indications for surgery in cases of cavernous angioma are limited to the presence of intractable seizures and/or overt evidence of hemorrhage.¹¹⁾ Therefore, whether surgery should have been undertaken in our case is controversial. The presence of pathological angiogenetic growth factors may suggest the development of new lesion.⁴⁾ Therefore, surgical intervention should be considered even in incidental cases. Careful considera-

tion is required before undertaking surgery under a definite diagnosis of cavernous angioma, even if the lesion is symptomatic or easily accessible with a benign nature, because of the unclear benefit of surgical intervention compared to the potential risks for the patient.³⁾ However, the preoperative differential diagnosis in our case could not exclude the possibility of a cystic astrocytic tumor at the genu of corpus callosum.¹²⁾ Therefore, we considered radiotherapy including gamma knife surgery as a therapeutic option. The final decision was made after minute simulation of the approach to the lesion and through repeated neuroimaging investigation. Cerebral angiography failed to distinguish between the possibilities of cavernous angioma and cystic glial tumor, owing to the absence of the vascular staining characteristics of both tumors. CT showed an irregular cystic mass with a calcified fragment inside the mass, but the margin was not so well defined as that of cavernous angioma. Previously, two cases of cavernous angioma which presented as cystic glial tumors were reported, but erroneous preoperative diagnosis was made in both cases.¹³⁾ Since final and definitive diagnosis of the tumor can only be obtained through histological examination, surgery may be justified, especially when glial tumor must be differentiated from cavernous angioma.^{11,14)}

We chose an ipsilateral interhemispheric route to the genu of corpus callosum without sacrificing any bridging veins into dural sinuses.^{1,2,5,6)} Although this approach is standard for attempting to remove the total mass, the extent of resection of the fibers running through the corpus callosum could not be estimated preoperatively. Fortunately, our patient developed no postoperative neurological deficits. Safety is of great concern in removal of genus corpus callosum,⁶⁾ as in our case. The contralateral approach should be considered for a larger mass extending into the lateral ventricle.⁷⁾

References

- 1) D'Angelo V, Napolitano M, Gorgolione L, Scarabino T, Latino R, Simone P, Bisceglia M: Surgical treatment of anterior callosal tumors. *J Neurosurg Sci* 41: 117-122, 1997
- 2) De Dvitiis E, Zona G: Tumors of callosal area: problems and surgical strategies. *J Neurosurg Sci* 39: 147-152, 1995
- 3) Del Curling O Jr, Kelly DL Jr, Elster AD, Craven TE: An analysis of the natural history of cavernous angiomas. *J Neurosurg* 75: 702-708, 1991
- 4) Houtteville JP: Brain cavernoma: A dynamic lesion. *Surg Neurol* 48: 610-614, 1997
- 5) Hutter BO, Spetzger U, Bertalanffy H, Gilsbach JM: Cognition and quality of life in patients after transcallosal microsurgery for midline tumors. *J Neurosurg Sci* 41: 123-129, 1997
- 6) Kachkov IA, Bictimirov RG, Annanapesov SM: Surgical treatment of glial tumors of genus corpus callosum and medial part of frontal lobes. *J Neurosurg Sci* 41: 113-115, 1997
- 7) Lawton MT, Golfinos JG, Spetzler RF: The contralateral transcallosal approach: experience with 32 patients. *Neurosurgery* 39: 729-735, 1996
- 8) Maraie JN, Awad IA: Intracranial cavernous malformations: Lesion behavior and management strategies. *Neurosurgery* 37: 591-605, 1995
- 9) Muzumdar DP, Misra BK, Bhaduri AS: Pineal region cavernoma. Case report. *Neurol Med Chir (Tokyo)* 40: 372-379, 2000
- 10) Reyns N, Assaker R, Louis E, Lejeune JP: Intraventricular cavernomas: three cases and review of the literature. *Neurosurgery* 44: 648-654, 1999
- 11) Robinson JR, Awad IA, Little JR: Natural history of the cavernous angioma. *J Neurosurg* 75: 709-714, 1991
- 12) Spetzler KJ, Sauve KI, Spence AM, Griffin TW, Berger MS: Corpus callosum involvement as a prognostic factor for patients with high grade astrocytoma. *Int J Radiat Oncol Biol Phys* 38: 27-30, 1997
- 13) Vaquero J, Cabezudo JM, Leunda G: Cystic cavernous haemangiomas of the brain. *Acta Neurochir (Wien)* 67: 135-138, 1983
- 14) Vaquero J, Leunda G, Martine R, Bravo G: Cavernomas of the brain. *Neurosurgery* 12: 208-210, 1983
- 15) Zabramski JM, Wascher TM, Spetzler RF, Johnson B, Golfinos J, Drayer BP, Brown B, Rigamonti D, Brown GB: The natural history of familial cavernous malformations: Results of an ongoing study. *J Neurosurg* 80: 422-432, 1994

Address reprint requests to: S. Harada, M.D., Department of Neurosurgery, Fujita Health University, 1-98 Dengakugakubo, Kutsukake-cho, Toyoake, Aichi 470-1192, Japan.