Large Calcified Cystic Cavernous Angioma in the Thalamus

—Case Report—

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Abstract
A 52-year-old female presented with an unusual large cystic cavernous angioma with dense calcification in the thalamus manifesting only as headache despite the large mass with surrounding brain edema. Both T₁- and T₂-weighted magnetic resonance images revealed a large cystic mass with an intramural nodule appearing a reticulated, irregular mixed intensity core. The lesion was totally removed through a transcortical-transventricular approach. The postoperative course was uneventful with no signs of neurological deficit or residual mass 5 years later.

Key words: cavernous angioma, cyst, calcification, thalamus, computed tomography, magnetic resonance imaging

Introduction
Cavernous angioma is a relatively rare vascular malformation in the central nervous system. Recently, cavernous angioma has been found more often by computed tomography (CT)¹,⁸,¹⁰,¹²,¹⁵,¹⁶ and/or magnetic resonance (MR) imaging.¹⁰,¹² Cavernous angioma frequently contains small cysts and/or tiny calcifications.

We describe a patient with a cavernous angioma in the thalamic region containing a large cyst and dense calcification.

Case Report
A 52-year-old female presented with a 2-year history of intermittent occipitalgia. Neurological examination on admission was normal. Plain x-ray films showed an abnormal calcification. Precontrast CT revealed a mass with a diameter of approximately 5 cm in the right thalamic region containing a large cyst with irregular-shaped dense calcification (Fig. 1 upper). Postcontrast CT showed the slightly enhanced cyst wall. MR imaging demonstrated a large low-intensity (but higher than cerebrospinal fluid intensity) mass containing an irregular mixed intensity area on the T₁-weighted images (Fig. 1 middle). The T₂-weighted MR images revealed a high-intensity lesion with surrounding brain edema and a reticulated, irregular mixed intensity core (Fig. 1 lower).

The lesion was totally removed by a transcortical-transventricular approach through a right temporoparieto-occipital craniotomy. The large cyst contained xanthochromic fluid.

Histological examination found the lesion containing of a network of vascular channels. The vessel walls usually showed collagenous thickening, and thrombosed vessels were frequently seen. Roundish calcified bodies were closely related to the thrombosed vessels. Linear calcification on the walls of non-thrombosed vessels was occasionally observed (Fig. 2 upper). Numerous calcified bodies were present in the surrounding gliosis (Fig. 2 middle). The cyst wall consisted of fibrous tissue containing neocapillaries with proliferation of inflammatory cells and hemosiderin deposits (Fig. 2 lower). The histological diagnosis was cavernous angioma.

The postoperative course was uneventful. Follow-up examination 5 years later found no neurological deficit and MR imaging revealed no residual mass (Fig. 3).
Discussion

Intracranial vascular hamartomas are classified into four groups based on histological features: 1) capillary telangiectasis, 2) cavernous angioma, 3) arteriovenous malformation, and 4) venous malformation. Cavernous angioma is a well-defined lesion consisting of sinusoidal vascular channels lined by a single layer of endothelial cells. The walls of the vessels consist of collagen fibers, and have no muscle nor elastic fiber. The surrounding stroma shows fibroblastic proliferation without intervening neural tissue. The histological differentiation between cavernous angioma and capillary telangiectasis is sometimes difficult, and the association of these lesions has been reported. The histological appearance of our case was compatible with cavernous angioma, but the vessel walls were usually thick and thrombosed vessels were frequent.

The cerebral hemisphere is the most common site for intracranial cavernous angioma. The posterior fossa, basal ganglia, or ventricular wall are

Fig. 1 upper: Precontrast CT scans showing a large cystic mass with dense calcification in the right thalamic region. middle: Axial $T_1$-weighted MR images (spin echo [SE] 350/35 msec) showing a large low-intensity mass with irregular mixed intensity. lower: Axial $T_2$-weighted MR images (SE 2000/50 msec) showing the lesion as a large high-intensity mass with a reticulated core of irregular mixed intensity.

Fig. 2 upper: Photomicrograph showing network of vascular channels with roundish calcified bodies (arrows) and linear calcification on the vessel walls (arrowheads). Hematoxylin and cosin (HE) stain, ×75. middle: Photomicrograph showing numerous calcified bodies in the gliosis. HE stain, ×75. lower: Photomicrograph of the cyst wall showing fibrous tissue containing neocapillaries and proliferation of inflammatory cells. HE stain, ×170.

Neurol Med Chir (Tokyo) 35, February, 1995
less frequently affected, and the thalamus is seldom involved. The most common clinical symptom of cavernous angioma is seizures, and others include headaches, intracranial bleeding, or focal neurological deficits. Our patient only manifested headache despite the large lesion associated with surrounding brain edema.

Cavernous angioma with a large cyst is unusual, compared to the association of small cysts. Although the etiology of cyst formation is not established, cyst growth may be the result of recurrent hemorrhage from sinusoids of the vascular malformation or from the neocapillaries of the cyst wall. The cyst membrane is histologically similar to the outer membrane of chronic subdural hematoma. Our histological findings also support the relationship between repeated minor bleeding and the formation of a large cyst.

Calcifications in cavernous angioma are visualized by plain x-ray films in 11–40% of cases. Calcification nests occur particularly within thrombosed luminae or intervascular spaces. In our case, three types of calcification nest were noted: 1) roundish calcification closely related to the thrombosed vessels, 2) linear calcification on the wall of non-thrombosed vessels, and 3) roundish calcified bodies in the gliosis. These calcifications are considered to be dystrophic calcification occurring under pathological conditions such as calcified tumors or aortic media.

The neuroimaging appearance of cavernous angioma is well known. CT shows these lesions as a well-defined hyperdense mass with mild postcontrast enhancement. The finding of calcification is suggestive of cavernous hemangioma, but is nonspecific and indistinguishable from calcifications seen in other intracranial lesions. The CT appearance of our case was unusual for cavernous angioma, so the differential diagnosis from other cystic lesions such as astrocytoma, oligodendroglioma, meningioma, or parasitic cyst was difficult. The characteristic MR imaging appearance of cavernous angioma is a reticulated mixed intensity core with a surrounding low-intensity rim especially on the T₂-weighted images. The mixed intensity area is due to varying blood flow within the lesion, thrombosis, recanalization, calcification, and intrallesional hemosiderin. Other MR imaging patterns include focal hyperintense, focal inhomogeneous hyperintense, and multifocal isointense centers. In our case, the intramural nodule appeared as a mixed intensity area on both T₁- and T₂-weighted images. MR imaging is the most sensitive diagnostic method for cavernous angioma even with a large cyst and dense calcification.

Intracerebral cavernous hemangioma can usually be treated by surgery, regardless of size or preoperative symptoms. Surgery is indicated to avoid the risk of subsequent bleeding or rapid growth of the cyst. In most patients, surgical removal is easy and the outcome of total removal is excellent.

References


Neurol Med Chir (Tokyo) 35, February, 1995

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