Subependymoma in the Lateral Ventricle Incidentally Detected by Routine Brain Examination

—Case Report—

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Abstract

A 42-year-old male visited our hospital for a routine brain examination, which incidentally identified an intraventricular mass lesion ($2.7 \times 1.6 \times 1.2 \text{ cm}^3$). Magnetic resonance imaging showed the tumor was isointense on the T₁-weighted image and hyperintense on the T₂-weighted and proton images. The intraventricular tumor was totally extirpated through the interhemispheric ipsilateral transcallosal approach. The histological diagnosis was subependymoma. Neuroimaging cannot differentiate this benign neoplasm from other more aggressive tumors. Widespread use of the medical checkup system is expected to find a higher incidence of otherwise non-identified asymptomatic lesions. Surgical extirpation is one of the treatment options to establish the correct diagnosis and to prevent symptoms.

Key words: subependymoma, intraventricular tumor, medical checkup

Introduction

Subependymoma is a rare, benign tumor of the central nervous system, first identified in 1945¹⁰⁾ and predominantly occurring in the ventricular system. Seven subependymomas (0.7%) were identified among 1000 intracranial neoplasms.⁸⁾ Most subependymomas are located in the fourth and the lateral ventricles.^{11,13)} Symptomatic subependymomas are sometimes identified due to hydrocephalus or the location-related symptoms.¹¹⁾ Some subependymomas are asymptomatic and are only identified at postmortem examination.^{3,6,11)} Most surgically treated subependymomas have been symptomatic, and asymptomatic subependymomas have rarely been treated. We present a case of asymptomatic subependymoma incidentally identified during a routine medical examination and treated surgically.

Case Report

An asymptomatic 42-year-old male visited our

hospital for a routine brain examination, which incidentally identified an intraventricular mass lesion. Initial neurological examination was unremarkable. There was no family history of phakomatoses. Computed tomography (CT) demonstrated an oval, solid, isodense lesion in the right lateral ventricle without hydrocephalus. Although no apparent cystic component was observed, spotty low dense areas were identified inside the tumor. No calcification or subependymal nodule was present (Fig. 1). Magnetic resonance (MR) imaging depicted the lesion as isointense on the T₁-weighted image, and hyperintense on the T₂-weighted and proton images. The tumor was partially enhanced by gadolinium-diethylenetriaminepenta-acetic acid (Gd-DTPA). The tumor, $2.7 \times 1.6 \times 1.2 \text{ cm}^3$ in size, was located in the right lateral ventricular floor and compressed the septum pellucidum. No intraparenchymal extension was observed (Fig. 2). Cerebral angiography was unremarkable.

Right frontoparietal craniotomy was performed and the tumor was totally resected through the interhemispheric ipsilateral transcallosal approach. Postoperative MR imaging revealed complete resection of the tumor without complications (Fig. 3).

Received July 15, 1997; Accepted November 6, 1997

Macroscopically, this elastic and whitish tumor contained many vacuoles. No hemorrhage or necrosis was identified. Histological examination found the tumor consisted of both fine eosinophilic fibrillar matrix and aggregated cells with a high nuclear/cytoplasmic ratio. There were many microcysts between the cells. Few astrocytic reactions were observed (Fig. 4).

Since the biological characteristics of this subepen-

Fig. 1 Preoperative computed tomography scan showing the subependymoma as an isodense tumor in the right lateral ventricle. No calcification is observed.

Fig. 2 Preoperative magnetic resonance images showing the subependymoma located in the body of right lateral ventricle as isointense on the T₁-weighted image (upper left) and hyperintense on the T₂-weighted (upper center) and proton (upper right) images. There are microcysts inside the tumor. No intraparenchymal extension is identified. Partial enhancement was observed after gadolinium-diethylenetriaminepenta-acetic acid administration (lower row).

Fig. 3 Postoperative magnetic resonance image after total resection of the tumor as shown on T₁-weighted (left) and T₂-weighted (right) images.

Fig. 4 Photomicrograph of the tumor specimen showing fine eosinophilic fibrillar matrix and aggregated cells with a high nuclear/cytoplasmic ratio. Microcysts are also observed. No hemorrhage or necrosis is present.

dymoma were benign and complete resection was achieved, no adjunctive therapy was administered. The patient was doing well without symptoms 6 months following the operation.

Discussion

Subependymoma has similar histological characteristics to glioma and ependymoma, but is not classified with either of these tumors. The exact origin of subependymoma is still controversial.¹¹ Subependymoma has benign properties and a good prognosis, so adjunctive treatment is not required if the histological diagnosis is established.

The CT and MR imaging characteristics of in-

traventricular subependymomas have been described previously.^{2,6,11,13} MR imaging shows subependymoma as iso- or hypointense on the T₁-weighted image and hyperintense on the T₂-weighted and proton images. Cystic components are sometimes observed.¹³ No or slight enhancement is caused by Gd-DTPA administration. Intraventricular tumors that should be differentiated from subependymoma include choroid plexus papilloma, meningioma, central neurocytoma, subependymal giant cell astrocytoma, germ cell tumor, and metastatic tumors. These intraventricular tumors are likely to be more enhanced with Gd-DTPA than subependymomas.² However, some subependymomas have been enhanced by Gd-DTPA. Therefore, CT and MR imaging cannot completely differentiate these intraventricular tumors.¹⁴

About 40% of subependymomas are symptomatic.⁶ Symptomatic subependymomas are 4 cm or more in diameter and are usually larger than "asymptomatic" subependymomas.¹¹ The subependymoma in our patient was relatively small compared to previous asymptomatic cases. Most ependymomas have localized attachments to the ventricular wall. However, subarachnoid space extension and/or secondary attachment to another ventricular wall may occur with growth,^{1,11} and may cause complications during surgical extirpation. Asymptomatic subependymomas may become symptomatic due to subarachnoid hemorrhage or intratumoral hemorrhage.^{5,7} Subependymomas can be completely resected, if small and/or not adherent to the ventricular wall. Many operative approaches, such as the transcortical, ipsilateral transcallosal, and contralateral transcallosal approaches, can be employed to treat intraventricular tumors.^{4,9,12} We used the ipsilateral transcallosal approach in our case, due to the relatively medial location and absence of intraparenchymal extension.

Treatment protocols are substantially different for subependymoma and aggressive tumors. Radiation therapy is usually administered to aggressive tumors following surgery. In contrast, subependymomas do not require adjuvant therapy if they are totally extirpated. However, intraventricular tumors cannot be completely distinguished by neuroimaging, so histological confirmation following surgical extirpation is recommended. This relatively rare and benign lesion should be kept in mind as part of the differential diagnosis of intraventricular tumors.

The treatment protocol for asymptomatic intraventricular tumors is controversial. The subependymoma in our patient was incidentally found during a medical checkup. Increased public awareness of individual health concerns has resulted in widespread

use of the medical checkup system in recent years. This system is expected to find a higher incidence of otherwise non-identified asymptomatic lesions. A lesion not found during medical checkup may become larger and symptomatic. Surgery is one of the treatment options to prevent symptoms. Intraventricular tumors generally tend to be larger than intraparenchymal ones, although they are asymptomatic. Surgical resection may become more difficult once the tumor becomes symptomatic due to secondary attachment to the ventricular wall. Informed consent should be obtained for surgical treatment of these asymptomatic tumors.

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