Neuroendoscopic Management of Symptomatic Septum Pellucidum Cavum Vergae Cyst Using a High-Definition Flexible Endoscopic System
—Case Report—

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Abstract
A 24-year-old man, who had an asymptomatic septum pellucidum cyst incidentally found one year previously, presented with severe headache and right abducens nerve palsy caused by expansion of the midline cyst. Preoperative magnetic resonance (MR) imaging revealed obstructive hydrocephalus due to the enlarged midline cyst. Neuroendoscopic fenestration of the septum pellucidum cyst was successfully performed via a right frontal approach using a high-resolution flexible neuroendoscopic system without complication. Communication between the cyst cavity and bilateral lateral ventricles was constructed via a single trajectory. The entire inner cyst wall could be inspected from the cyst cavity by manipulating the flexible neuroendoscopic system, which excluded the presence of neoplasm. His symptoms were completely relieved after surgery, and postoperative MR imaging showed significant improvement of hydrocephalus and shrinkage of the midline cyst. Septum pellucidum cavum vergae cyst may expand and become symptomatic, so fenestration using a flexible neuroendoscope system may be the optimal method for constructing communication to the bilateral lateral ventricles with minimal invasion.

Key words: septum pellucidum cavum vergae cyst, neuroendoscopic fenestration, flexible endoscope

Introduction
Cavum vergae cysts of the septum pellucidum (CSPs) are detected in 15% of the asymptomatic adult population, and are considered to be a normal variant that usually do not require surgical treatment. However, some cases become symptomatic by causing obstruction of cerebrospinal fluid flow through the foramen of Monro, leading to various symptoms including headache, papilledema, emesis, loss of consciousness, and visual and sensorimotor disturbances caused by secondary increases in intracranial pressure (ICP) and hydrocephalus.9 Surgical treatments include open surgical procedures, ventriculoperitoneal shunting, stereotactic fenestration, and neuroendoscopic cysto-ventriculostomy.1,2,8,16 Neuroendoscopic fenestration using a rigid endoscope is a relatively recent technique that offers several advantages,2,8,11,12,21 whereas neuroendoscopic fenestration using a flexible endoscope is less established.6,8

Here we report a case of symptomatic CSP that was successfully treated by endoscopic fenestration using a flexible neuroendoscope.

Case Report
A 24-year-old man, who had an asymptomatic CSP incidentally found one year previously (Fig. 1A), presented with severe headache and right abducens nerve palsy caused by expansion of the midline cyst (Fig. 1B). Neurological examination on admission found that his consciousness was clear, and identified no neurological abnormality except for the right abducens nerve palsy probably caused by increased ICP. Computed tomography and magnetic resonance (MR) imaging of the brain revealed an enlarged, space-occupying CSP with secondary obstructive hydrocephalus at the foramen of Monro (Fig. 2).

Neuroendoscopic fenestration of the CSP was planned to normalize the ICP by evacuating the cyst content and subsequent improvement of obstructive hydrocephalus using a new flexible neuroendoscopic system (EVIS LUCERA SPECTRUM Video Imaging System; Olympus, Tokyo), similar to videoscope,14 in which small charge coupled device (CCD) camera is equipped at the tip of the flexible scope.6 A burr hole was placed in the right frontal region under general anesthesia. The sheath was inserted into the anterior horn of the right lateral ventricle, through which the high-resolution flexible endoscope was in-
Fig. 1 Axial computed tomography scans showing a cyst of septum pellucidum which was incidentally detected with no symptom (A), and growth of the cyst with enlargement of the lateral ventricles manifesting as severe headache one year later (B).

Fig. 2 Preoperative axial T2-weighted (A) and coronal constructive interference in steady state (B) magnetic resonance images showing the enlarged cyst of septum pellucidum, and the obstructed foramina of Monro (B, arrows).

Fig. 3 Neuroendoscopic images showing the approach via the anterior horn of the right lateral ventricle, revealing the enlarged cyst wall (A), avoiding the small vessel in the cyst wall, the fenestration using forceps and Fogarty balloon catheter (B), fenestration of the other side of the cyst (C), resulting in opening of the right foramen of Monro and confirmed cerebrospinal fluid flow (D), and observation of the internal cyst at the multiple angles indicating no abnormal findings (E).

The postoperative course was uneventful. His headache and right abducens nerve palsy improved immediately after surgery. Postoperative computed tomography and MR imaging confirmed shrinkage of the CSP and normalization of ventricular size (Fig. 4). The patient was discharged 11 days after surgery without neurological deficit. No recurrence was detected during the follow-up period of 5 months.

Discussion

CSPs have been known since at least 1931, and can be divided into non-communicating and communicating cysts, depending on whether the cyst communicates with the cerebral ventricular system or not. The communicating type is the most common, and is considered to be asymptomatic. In contrast, non-communicating cyst, which could originally be asymptomatic, may enlarge, block the foramen of Monro, and cause symptomatic

Neurol Med Chir (Tokyo) 49, November, 2009
hydrocephalus. Communicating cyst become non-communicating cyst through various mechanisms. For example, the cyst might secrete fluid, possibly through the presence of migrated ependymal cells, resulting in cyst expansion. The check valve phenomenon between the cyst and the subarachnoid cavity may be implicated based on immunohistochemical analysis. The involvement of minor head injury was also implicated in the expansion of CSP. These mechanisms are based on the idea that enlargement occurs in the natural history of the cyst. However, the exact mechanism of CSP expansion remains undetermined, since most reported cases were only identified after becoming symptomatic.

The present case of asymptomatic CSP was incidentally identified one year prior to manifesting as obstructive hydrocephalus caused by expansion of the CSP. The initial neuroimaging finding during the asymptomatic period was typical CSP, which enlarged during the follow-up period. The exact mechanism by which the present case became symptomatic is undetermined. We cannot exclude the possibility that very minor head injury or spontaneous minor hemorrhage was contributory, at least in part, to the pathology in the present case, although the patient had no apparent history of head injury or association of other pathology such as neoplasm. Further evaluation of the natural history of asymptomatic CSP is necessary to clarify the incidence and mechanism of the transition to the symptomatic CSP.

Surgical management of symptomatic expanding CSP includes the neuroendoscopic procedure using the rigid endoscopes. The rigid endoscope is considered to provide clearer vision compared to the flexible neuroendoscope, but has the limitation of the operation field obtained by the single trajectory. In our case, we employed a high-resolution flexible neuroendoscopic system with a small CCD camera mounted at the tip of the flexible endoscope, which provided surgical vision as clear as that provided by the rigid endoscope. Furthermore, use of the flexible neuroendoscope allowed fenestration to the bilateral lateral ventricles via a single trajectory, and thorough inspection of the inner walls of the cyst at multiple angles with minimal invasion. We consider that fenestration to the bilateral lateral ventricles allowed by the use of flexible neuroendoscope may help to maintain the cerebrospinal fluid flow, and thus prevent the recurrence of CSP. Thorough inspection of the entire cyst wall by the flexible neuroendoscope may also allow the intraoperative diagnosis of CSP by excluding the presence of neoplasm. Based on our findings, we recommend neuroendoscopic fenestration of symptomatic CSP using the flexible endoscopic system as the treatment of choice.

References


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