

## Case Report

# A case of a mobile choroid plexus cyst presenting with different types of obstructive hydrocephalus

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## Abstract

**Background:** Although it is well known that most choroid plexus cysts (CPCs) are asymptomatic, previous studies have reported that they can infrequently cause progressive hydrocephalus along with their increasing sizes. Among those cases, some patients needed cyst fenestration or cerebrospinal fluid (CSF) diversion to recover neurological deterioration. Meanwhile, some CPCs revealed spontaneous resolution, and in rare cases, they developed re-accumulation. Some reports have described series of radiological findings about their changes in location.

**Case Description:** We present a 47-year-old male with CPC manifesting obstructive hydrocephalus. Radiological findings of the lateral and the third ventricles changed along with their different obstructive points, leading to their own symptoms. Because the patient's symptoms were not resolved completely, he underwent endoscopic fenestration for the cyst at the third ventricle. We could perform near-total resection, resulting in recovery of normal CSF flow. Postoperatively, the size of the ventricles decreased, with histological confirmation of a CPC. His symptoms resolved clearly without any complications.

**Conclusions:** It seems quite unusual that shift of the CPC location in the ventricle systems could induce not only different types of hydrocephalus but also their own symptoms. We need to consider that the location of CPCs might change when patients present with fluctuating symptoms over time.

**Key Words:** Choroid plexus cyst, endoscopic surgery, obstructive hydrocephalus

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## INTRODUCTION

Choroid plexus cysts (CPCs) rarely become symptomatic and are reported in 2.8% of fetal subjects upon second-trimester ultrasound examinations.<sup>[7]</sup> In adults, most CPCs are asymptomatic and discovered incidentally.<sup>[6]</sup> However, some previous reports suggested that CPCs could cause obstructive hydrocephalus.<sup>[2,11]</sup> Meanwhile, in other patients, they infrequently appear spontaneously resolved, and in rare

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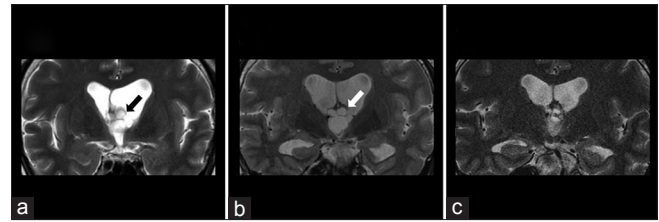
cases, they re-accumulate.<sup>[1,3,8-11]</sup> Some authors suggested a mechanism in which CPCs can be flexible and cause repeated symptomatic obstructive hydrocephalus, and cerebral ultrasonography revealed that the floating CPC shifted to the foramen of Monro and obstructed cerebrospinal fluid (CSF) pathways.<sup>[12]</sup> We experienced an adult patient with fluctuating symptoms associated with CPCs. The series of radiological findings indicated that the flexible CPCs shifted their locations, resulting in different types of obstructive hydrocephalus, each with their own symptoms.

## CASE REPORT

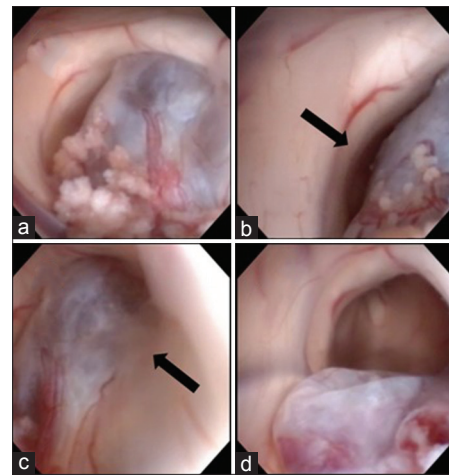
A 47-year-old healthy man consulted a local hospital with complaints of unsteadiness and dizziness. Despite magnetic resonance imaging (MRI) revealing a cystic lesion in the third ventricle, he presented with no neurological abnormalities and his symptoms disappeared shortly. One year later, he was referred to the hospital again with complaints of headache. MRI revealed unilateral obstructive hydrocephalus with enlargement of the cyst, which occluded the foramen of Monro and protruded into the left lateral ventricle [Figure 1a]. He was referred to our hospital for the surgery of cyst fenestration, and his headache resolved spontaneously. Endoscopic biopsy of the cyst wall was scheduled for the relief of headache and histological confirmation was obtained one month later. Upon admission for operation, MRI revealed that the cyst drew back in the third ventricle, and the shape of the ventricles turned out to be symmetrical. However, the ventricles still remained enlarged [Figure 1b]. The sequential MRI findings demonstrated that the cyst at the third ventricle was flexible in its location and induced noncommunicative hydrocephalus with different obstructive points. He complained of different types of headaches, and finally we decided to perform endoscopic surgery to eliminate the symptom and normalize CSF flow in the ventricles.

The patient underwent endoscopic cyst fenestration at the third ventricle via the left lateral ventricle with a fiberscope (VEF-V, Olympus, Japan). The cystic lesion occupied the enlarged foramen of Monro [Figure 2a]. There was a slight gap around the cyst wall at the foramen of Monro and the cyst wall, and some granular tissue could be found through the cyst wall. The cyst wall was connected to the choroid plexus behind the foramen of Monro [Figure 2b]. Most of the cyst wall could be easily removed using endoscopic forceps, but the small part of the cyst wall was tightly adhered to the choroid plexus and was left untouched [Figure 2c]. Finally, near-total resection was achieved to recover the physiological CSF flow through the foramen of Monro [Figure 2d].

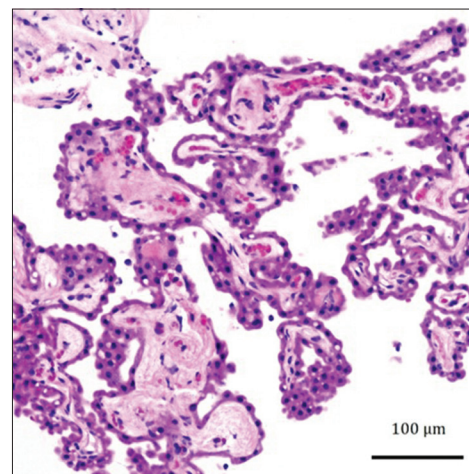
Upon pathological examination of the surgical specimen, cuboidal epithelia lined with connective tissue were



**Figure 1:** T2-weighted coronal magnetic resonance images. (a) The cystic lesion (black arrow) located in the third ventricle caused obstructive hydrocephalus with asymmetrical enlargement of the ventricles. (b) Preoperative image showing the asymmetrical enlargement of ventricles remained because of previous protrusion of the cyst into the left lateral ventricle regressed into the third ventricle (white arrow). (c) Postoperative image revealing the ventricular size decreased



**Figure 2:** Operative findings. (a) The cyst arising from the third ventricle and protruding into the left foramen of Monro. (b) A slight gap between the cyst wall and the edge of the foramen of Monro (black arrow). (c) The cyst adhered to the choroid plexus at the edge of the foramen of Monro (black arrow). (d) The cyst decreased in size after surgery, confirming the bottom of the third ventricle



**Figure 3:** Hematoxylin and eosin staining shows cuboidal epithelium lining with the collagen tissue, leading to the diagnosis of choroid plexus cyst

found in papillary patterns with some calcification and no malignant appearances [Figure 3]. Immunoreactivity

for epithelial membrane antigen and glial fibrillary acidic protein were positive in cuboidal epithelia, and these findings are consistent with CPCs.

The postoperative course was excellent, and his symptoms disappeared completely. MRI revealed the ventricles were reduced in size compared to preoperatively [Figure 1c]. The patient was discharged on postoperative day 10 without any complications. He presented no complications for 6 months postoperatively.

## DISCUSSION

In the present report, we described a case of a previously healthy man who complained of fluctuating symptoms with a CPC at the third ventricle. The cyst changed its location and caused different types of obstructive hydrocephalus. Endoscopic surgery relieved his symptoms without any neurological deficits. This is the first case report that demonstrates a flexible CPC manifesting different types of obstructive hydrocephalus, as revealed on the chronological MRI findings.

CPCs are kinds of neuroepithelial cysts, usually located in the lateral ventricles, and rarely in the third ventricle.<sup>[11]</sup> In general, these cysts are asymptomatic, but sometimes cause symptomatic obstructive hydrocephalus.<sup>[2,11]</sup> Their symptoms are reported as acute headache, vomiting, somnolence, and declining mental status.<sup>[8]</sup> MRI is useful to identify CPCs associated with obstructive hydrocephalus.<sup>[6,8]</sup>

Flexible CPCs sometimes recur as symptomatic obstructive hydrocephalus. These cysts change their locations causing obstructive hydrocephalus along with the alternation of CSF pressure balance. In cerebral ultrasonography, some case reports described CPC in childhood showed that the CPC obstructed CSF pathways at the foramen of Monro while crying.<sup>[12]</sup> Crying is considered to be one mechanism to induce changes in CSF pressure balance, while the cyst prolapses from the third ventricle into the left lateral ventricle. Unilateral obstructive hydrocephalus occurs with the cystic lesion occluding the foramen of Monro. The CPCs would change locations with posture changes, leading to changes in symptoms, such as acute debilitating, nausea, vomiting, and posture headaches.<sup>[2]</sup> These reports indicated that the changing locations of flexible CPCs can cause “intermittent” obstructive hydrocephalus. However, it had never been shown that sequential changes in locations of CPCs resulted in different types of CSF dynamic disturbances.

The effectiveness of endoscopic surgery for intraventricular cysts has been reported by many authors.<sup>[4,6]</sup> The endoscopic approach is less invasive than craniotomy, and can avoid both aggressive craniotomy and inserting shunt systems into the body. However, endoscopic treatments require skillful techniques.<sup>[10]</sup> The total resection of the

cyst wall is not always recommended, and the part of the cyst wall adhering to the surrounding neural tissue should not be removed.<sup>[5]</sup> In our case, tightly adhered cyst walls were left to avoid massive bleeding from the choroid plexus.

There are some differences in clinical symptoms between adults and children. Most cases of flexible CPCs in childhood have been reported to present as acute obstructive hydrocephalus.<sup>[1,3,8-12]</sup> However, it is difficult to detect these symptoms and signs accurately in children. In contrast, some adult patients with obstructive hydrocephalus caused by CPCs complained of chronic obscure symptoms.<sup>[2,6]</sup> Obstructive hydrocephalus caused by CPCs in adulthood progressed more gradually than that in childhood, because there is greater ventricle volume in adult patients to compensate for cyst growth.

We experienced the first case of an adult patient who suffered from a flexible CPC inducing different types of obstructive hydrocephalus. These cysts in adults would sometimes develop as chronic obscure symptoms. We need to consider CPCs that are flexible when patients present with fluctuating symptoms as a possible operative indication.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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