Endoscopic Treatment of a Midbrain Cyst: Case Report and Review of the Literature

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Abstract

Background and Importance: Midbrain arachnoid cysts are rare and usually present with symptoms associated with the mass effect or secondary hydrocephalus and require treatment. Because of their location, minimally invasive approaches using the endoscope are ideal since the open approach is difficult.

Clinical Presentation: A 52-Years-old woman presented in the hospital for an acute confusional state and headaches. On examination, she had a partial Parinaud’s syndrome, and on history, she had been complaining of progressive diplopia for over two years. Imaging showed a large non-enhancing cystic lesion in the right mesencephalic-thalamic junction and descending to the cerebral peduncle, compressing the posterior aspect of the third ventricle and the aqueduct of Sylvius and responsible for secondary ventriculomegaly. She was treated with an endoscopic fenestration of the cyst, which leads to resolution of her symptoms.

Conclusion: A contralateral endoscopic approach is a good minimally invasive technique for midbrain cysts, but such cases haven’t been widely reported. We discuss our case and provide a review of the literature showing good long-term outcomes when fenestrated into the ventricular system.

Keywords: Midbrain; Cysts; Neuroendoscopy; Parinaud’s syndrome

Introduction

Midbrain arachnoid or ependymal cysts are rare, and usually present with symptoms associated with the secondary hydrocephalus, or from the mass effect of the lesion itself. Because of their location, the open approach is difficult, but it is amenable to minimally invasive treatment by endoscopy. Neuroendoscopy is increasingly used to fenestrate arachnoid cysts into the cysternal or ventricular system, as it is less invasive than an open approach. Whether or not to leave a stent behind is a controversial question, as some argue that only fenestrating the cyst might lead to reaccumulation; while other argue that leaving foreign material behind increases the risk of infection. We describe a case of a midbrain cyst presenting with a partial Parinaud’s syndrome followed by acute confusion; which was treated by endoscopic fenestration and remained stable for at least 4 years.

Case Report

History and Examination

A 52-Years-old woman was brought to the emergency department after a morning at work where she was found confused by her collaborators. She had been complaining of progressive diplopia over the last 2 years, as well as in the last month, worsening headaches and pain in the right arm. When she presented in the hospital, she was confused to date and location, had a limitation in the elevation of both eyes, had a horizontal binocular diplopia, a convergence retraction nystagmus as well as an upbeat nystagmus on upgaze, compatible with a partial Parinaud’s syndrome.

Imaging

A CT, followed by an MRI showed a large cystic lesion (2.1 × 2.1 × 2.3 cm) in the right mesencephalic-thalamic junction and descending to the cerebral peduncle, compressing the posterior aspect of the third ventricle and the aqueduct of Sylvius and responsible for secondary ventriculomegaly. The cystic lesion was not enhancing and was thought to be an arachnoid or ependymal cyst (Figures 1-4).

Treatment

A minimally invasive approach with the endoscope was chosen,
the goal of the treatment being to decrease the mass effect on the adjacent structures by fenestrating the cyst and hopefully normalize the CSF flow.

The patient was operated through a left frontal burr hole, with the assistance of the neuronavigation. We used a rigid zero degree Storz ventriculoscope. Once the third ventricle was entered, the mamillary bodies and the mass intermedia were visualized. The cyst was identified as a bulging structure in the posterior contralateral wall of the ventricle. It was confirmed with neuronavigation, and a sharp endoscopic monopolar was used to mechanically pierce the wall of the ventricle. CSF like fluid was identified in the cyst, and some flow was seen entering the ventricle from the cyst. Then alligator forceps were used to enlarge the hole. An EVD was left in place, clamped, as a safety in case of acute hydrocephalus. It was removed after 24h after having remained clamped.

**Postoperative Course**

The patient progressively became less confused and normalized her neurological exam over a couple of days. Two months post-procedure, she was asymptomatic and her MRI showed a residual cyst measuring 9mm in its largest axis, no mass effect, and resolution of the ventriculomegaly. After 4 years, the cyst size remained the same and the patient continued to be asymptomatic.

**Discussion**

Most patients with an intraparenchymal mesencephalic-midbrain cyst present with slowly progressive symptoms, hydrocephalus, oculomotor and sometimes long tract signs [1–5]. Cysts in this regions are usually reported as being arachnoid or ependymal cysts [4,6–10], and therefore are benign lesions that need symptomatic treatment only, with some exceptions such as metastasis or colloid cysts [11], which have specific radiological characteristics.

Treatment of these lesions has been reported under different forms [1,3,4,7,11]. The cyst can be aspirated stereotactically [1] or can be treated by repeated aspiration through an Ommaya placed in the cyst [12–14]. Shunting of the symptomatic hydrocephalus is also a solution but doesn't solve the local mass effect [4,13,15] or the cyst itself can be shunted [15,16]. Most commonly, however, the cyst will be fenestrated using an open procedure [17]. Only a few cases of endoscopic or endoscopically-assisted procedures have been described for such cysts, or other paraventricular tumors [6,8,18–21].

With the technological advancement of neuroendoscopy [22], endoscopic procedures have been increasingly used for intraventricular lesions, as well as arachnoid cysts in general [23,24]. Better lenses have enabled cleaner visualization and therefore safer procedures and an increasing number of endoscopic tools have made the interventions easier. While mesencephalic or midbrain ependymal cysts are not directly intraventricular, most have only a small lining of parenchyma between the ependymal wall of the ventricle and their cavity. They are therefore easily accessible with an endoscope, which is an elegant technique with minimal impact on the brain. The advantage of the endoscope over an open technique is the fact that it allows a maximal visualization for a minimal opening. Endoscopes have been used to treat a different kind of intracranial and paraventricular cysts, such as arachnoid cysts [25–27], colloid cysts [27,28], Rathke’s cleft cysts and cystic craniopharyngiomas [27,29], as well as biopsies of intraventricular and paraventricular tumors [27,30].

Previous case reports have been reported but remain rare. van
Lindert E et al. [31] reported a series consisting of five cases, three being treated solely with the endoscope, one as an endoscopically-assisted case and the last one with the microscope. Conrad j, et al. [6] also reported some ependymal cysts in the mesencephalic region treated endoscopically with good results and Fiorindi A et al. [32] reported four cases treated endoscopically, one of them requiring the insertion of a Ommaya reservoir with another approach. As in our case, in most cases the patients had an improvement of the symptoms after surgery, with most commonly a reduction in size or disappearance of the cyst, however, some cysts remained the same with a reduction of the symptomatology [31], with no recurrence after more than 1y [26,31].

No major complication arising from endoscopic treatment have been reported; the main problem being probably the inability to finish surgery or fenestrate the cyst adequately. In those cases, the procedure can be extended to an endoscopically-assisted surgery (inserting instruments through a second small corticectomy) [31] or converted to a microscopic approach.

Another controversy is whether or not to leave a stent behind. Some argue in favor of a stent or grommet as they experienced a recurrence after more than 1y [26,31].


Table 1: Mesencephalic, midbrain or pontine cysts endoscopically treated and the need for a stent.

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Adult/Pediatric – No of cases</th>
<th>Stent/grommet/Ommaya</th>
<th>FU – Size of cyst</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Lindert, 1998 [31]</td>
<td>Adult – 5 (3 endoscopic)</td>
<td>No, but one required a reoperation 4 mo later (endoscopic ventriculocisternostomy)</td>
<td>Stable at 7-12 mo</td>
</tr>
<tr>
<td>Schroeder, 1996 [34]</td>
<td>Adult</td>
<td>No</td>
<td>Stable at 13 mo</td>
</tr>
<tr>
<td>Mascalchi, 1999 [35]</td>
<td>Adult-2</td>
<td>Yes for 1 – VP shunt</td>
<td>Increase in size of cyst at 4y after shunt placement</td>
</tr>
<tr>
<td>Rohlfs, 2005 [36]</td>
<td>Pediatric</td>
<td>Yes, Grommet after recurrence for fenestration alone after 8mo</td>
<td>Stable at 5y</td>
</tr>
<tr>
<td>Fayeye, 2010 [37]</td>
<td>Adult</td>
<td>No</td>
<td>Stable at 4y</td>
</tr>
<tr>
<td>Case reported here</td>
<td>Adult</td>
<td>No</td>
<td>Stable at 4y</td>
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References


