UPRATENTORIAL cysts located within the interhemispheric fissure are very rare lesions. Only a few isolated case reports and four larger reports have involved these lesions.\textsuperscript{3,6,10,16,19,23} Interhemispheric cysts in children are usually associated with midline neurodevelopmental disorders, typically partial or complete corpus callosum agenesis. The confusion between these cysts, in which a normal hemispheric separation has occurred during the embryonic stage, and dorsal cysts associated with nonlobar holoprosencephaly, in which separation of the telencephalic vesicles is absent, has contributed to poor knowledge of their prognosis and management.\textsuperscript{16,23} Several options for the management of symptomatic arachnoid cysts have been described, including stereotactic aspiration, excision, fenestration, cystocisternostomy, ventriculocystostomy, and the placement of cystoperitoneal shunts;\textsuperscript{7} however, there is controversy regarding the optimum treatment. Both craniotomy and placement of cystoperitoneal shunts are associated with good outcome. The use of the shunts avoids morbidity related to open surgery. Craniotomy and microsurgical fenestration offer the advantage of avoiding the insertion of a permanent CSF shunt and the known complications of this type of procedure.\textsuperscript{6} The use of endoscopic methods to create areas of communication between the cyst, the ventricular system, and/or the subarachnoid space is an attractive alternative to the use of shunts and microsurgery.
Neuroendoscopy in interhemispheric cysts

The clinical management of arachnoid cysts, to the best of our knowledge, the authors have not cited any cases of endoscopic treatment of interhemispheric cysts. We report our experience in the treatment of seven consecutive patients with interhemispheric cysts who were treated endoscopically in the last 5 years.

Clinical Material and Methods

Between 2000 and 2005, seven consecutive pediatric patients with interhemispheric cysts underwent neuroendoscopic treatment: five at Santobono-Pausilipon Pediatric Hospital in Naples and two at Regina Margherita Pediatric Hospital in Turin, Italy. The patients’ medical histories and the operative data were retrospectively reviewed and are summarized in Table 1. The mean age of the patients at the time of neuroendoscopic surgery was 30.9 months (range 14 days–12 years). Imaging evaluation (Figs. 1–6) included serial CT scanning and pre- and postoperative MR imaging in all cases and MR images with DRIVE T₁-weighted sequences and cine-phase contrast CSF flow studies in two cases. All the patients were boys. In three patients (Cases 1, 2, and 6) a prenatal diagnosis of interhemispheric cyst and ventricular dilation was established. Corpus callosum agenesis was diagnosed in one patient prenatally. In one patient a cystoperitoneal shunt was placed at birth and he underwent an endoscopic procedure 7 months later because progressive enlargement of the cyst cavity had resulted in shunt obstruction. The enlargement was discovered on neuroimaging. Serial imaging showed progressive enlargement of a cyst in two patients: one was asymptomatic (Case 5; Fig. 1) and the other had severe developmental delay (Case 4; Fig. 2). Three patients presented with progressive macrocrania (Cases 2, 3, and 7). One patient (Case 2) presented with raised ICP. Associated hydrocephalus was present in two patients and was identified by occlusion of the cerebral aqueduct. In the first patient (Case 4), the occlusion was identified by extrinsic compression of the mesencephalon as a result of the lower pole of the cyst herniating into the tentorial hiatus (Fig. 2C); in the second patient (Case 3), aqueduct occlusion was provoked by the posterior pole of the cyst completely filling the malformed third ventricle (Fig. 3A and B). Corpus callosum agenesis was diagnosed in six patients, and corpus callosum hypogenesis (absence of posterior body and splenium) was discovered in one (Table 1). The endoscopic procedures performed consisted of cystoventriculostomy in two cases, cystocisternostomy in two, and cystoventriculocisternostomy in three. In one patient, the endoscopic procedure was associated with removal of an obstructed cystoperitoneal shunt. All the patients attended follow-up examinations in which they underwent psychomotor evaluation (the Brunet-Lezine Scale of Psychomotor Development for children from 1–30 months of age, the Wechsler Preschool and Primary Scale of Intelligence test for those from 4–6 years of age, and the Wechsler Intelligence Scale for Children test for those from 6–16 years of age).

Surgical Techniques

The endoscopic procedures were performed after induction of general endotracheal anesthesia, using a steerable Codman Neuroendoscope (Codman & Shurtleff, Raynham, MA), a rigid fiberscope (Channel Neuroendoscope; Medtronic, Minneapolis, MN), or a rigid rod–lens endoscope (Karl Storz, Tuttingen, Germany). Fenestration was performed using monopolar (ME2; Codman & Shurtleff) or bipolar coagulation. Dilation of the fenestrations was performed using grasp forceps and a No. 3 French Fogarty balloon or double-balloon catheter (Lightouch balloon; Integra Neuroscience, Biot, France).

The choice of the endoscopic approach was mainly dictated by the size and location of the cyst, the size of the ventricular system, and the relationship between the third ventricle and the cyst. Endoscopic trajectories were chosen to create areas of communication between the cyst and the ventricular system, the cyst and the subarachnoid space of the basal cistern (usually the lamina quadrigemina cistern, the interhemispheric fissure cistern, or the preoptic cistern), or both, when possible. If cysts were adjacent to the ventricular system and the lining walls were thin enough that a fenestration could be performed safely, an opening between the cysts and the ventricles was achieved (cystoventriculostomy). To perform a cystoventriculostomy, the endoscope was inserted first into the cyst, in all but one case through a paramedian bur hole (drilled in the frontal, parietal, or occipital region, depending on the location of the cyst), and after visualization of the ventricular wall, the stroma was created. In the remaining case, the right lateral ventricle was cannulated first and then the cyst was penetrated.

If the supratentorial ventricular system was large enough to be navigated using the endoscope, additional fenestration between the ventricular system and the subarachnoid space was performed toward the interpeduncular cistern, through the floor of the third ventricle (third ventriculostomy). However, if fenestration in the ventricular system was judged too risky, fenestration was performed toward the interhemispheric fissure or lamina quadrigemina cistern (cystocisternostomy).

In the patient in Case 1, a cystocisternostomy was performed toward the lamina quadrigemina subarachnoid space through a parietal bur hole. In the patients in Cases 2 and 3, a cystoventriculocisternostomy was performed through coronal bur holes. In the patient in Case 2, an area of communication was created between the cyst, the lateral ventricle, and the interhemispheric cistern. In the patient in Case 3, an area of communication was created between the cyst, the lateral ventricle, the third ventricle, and the interpeduncular cistern. In the patient in Case 4, a cystoventriculostomy was performed through a retrocoronal bur hole that opened an area of communication between the cyst, which was lined with ependymal cells, and the third ventricle. In the patient in Case 5, a cystoventriculocisternostomy was performed to provide fenestration between a right occipital paramedian cyst, the trigone of the right lateral ventricle, and the quadrigeminal cistern. In the patient in Case 6, in whom the endoscopic procedure was performed via a parietal bur hole, the cyst was fenestrated into the lateral ventricle. In the patient in Case 7, in whom the endoscopic procedure was performed via a coronal bur hole, the cyst was fenestrated into the interpeduncular cistern. In all cases, an area of communication was confirmed by direct visualization during surgery.

Results

The follow-up period for all seven patients ranged from 12 to 49 months (mean 31.6 months; Table 1). Endoscopic
<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age at Op</th>
<th>Site</th>
<th>Associated Malformations</th>
<th>Previous Shunt</th>
<th>Presentation</th>
<th>Endoscopy</th>
<th>Second Op</th>
<th>Results</th>
<th>Complications &amp; Treatment</th>
<th>FU (mos)</th>
<th>Psychometric Test &amp; Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8 mos</td>
<td>Lt parietal</td>
<td>corp call hypogenesis</td>
<td>no</td>
<td>antenatal diagnosis; cyst enlargement on MRI</td>
<td>CCS</td>
<td>endoscopic CCS</td>
<td>partial success; repeated endoscopy; no shunt; asymp</td>
<td>none</td>
<td>48</td>
<td>WPPSI verbal IQ = 95; performance IQ = 80; total IQ = 87</td>
</tr>
<tr>
<td>2</td>
<td>15 days</td>
<td>FP</td>
<td>corp call agenesis</td>
<td>no</td>
<td>lethargy; macrocrania</td>
<td>CVCS</td>
<td>none</td>
<td>complete success; no shunt; asymp</td>
<td>none</td>
<td>49</td>
<td>WPPSI verbal IQ = 95; performance IQ = 72; total IQ = 82</td>
</tr>
<tr>
<td>3</td>
<td>52 mos</td>
<td>rt frontal</td>
<td>corp call agenesis; hydrocephalus</td>
<td>no</td>
<td>macrocrania; DD</td>
<td>CVCS</td>
<td>none</td>
<td>complete success; no shunt; asymp</td>
<td>subdural collection; seizure; no shunt required</td>
<td>16</td>
<td>WPPSI verbal IQ = 67; performance IQ = 57; total IQ = 59</td>
</tr>
<tr>
<td>4</td>
<td>12 yrs</td>
<td>FP</td>
<td>corp call agenesis; hydrocephalus</td>
<td>no</td>
<td>seizures; severe DD; macrocrania; cyst enlargement on MRI</td>
<td>CVS</td>
<td>SDP shunt</td>
<td>complete success; no shunt; no clinical improvement</td>
<td>subdural collection; seizure; SDP shunt</td>
<td>12</td>
<td>WISC-R verbal IQ = 55; performance IQ = 49; total IQ = 48</td>
</tr>
<tr>
<td>5</td>
<td>7 mos</td>
<td>rt occipital</td>
<td>corp call agenesis</td>
<td>no</td>
<td>asymp; cyst enlargement on MRI</td>
<td>CVCS</td>
<td>LP shunt</td>
<td>partial success; LP shunt removed 8 mos later; asymp</td>
<td>subcutaneous CSF collection</td>
<td>12</td>
<td>B-LSPD (at 17 mos) global = 14 mos, 7 days postural = 13 mos, 15 days behavioral = 14 mos, 12 days language = 15 mos social = 15 mos</td>
</tr>
<tr>
<td>6</td>
<td>7 mos</td>
<td>rt occipital</td>
<td>corp call agenesis; hydrocephalus</td>
<td>CP shunt</td>
<td>antenatal diagnosis; shunt malfunction</td>
<td>CVS; CP shunt removal</td>
<td>none</td>
<td>complete success</td>
<td>none</td>
<td>40</td>
<td>WPPSI verbal IQ = 73; performance IQ = 62; total IQ = 65</td>
</tr>
<tr>
<td>7</td>
<td>9 mos</td>
<td>rt occipital</td>
<td>corp call agenesis</td>
<td>no</td>
<td>macrocrania</td>
<td>CCS</td>
<td>none</td>
<td>complete success</td>
<td>subdural collection; no shunt required</td>
<td>44</td>
<td>not performed</td>
</tr>
</tbody>
</table>

* Asymp = asymptomatic; B-LSPD = Brunet–Lezine Scale of Psychomotor Development; CCS = cystocisternostomy; corp call = corpus callosum; CP = cystoperitoneal; CVCS = cystoventriculocisternostomy; CVS = cystoventriculostomy; DD = developmental delay; FP = frontoparietal; FU = follow up; SDP = subdureperitoneal; WISC-R = Wechsler Intelligence Scale for Children–revised; WPPSI = Wechsler Preschool and Primary Scale of Intelligence.
procedures were completed successfully in all cases. Complete success (control of cyst size, with no additional surgical procedures) was achieved in five patients (three with controlled hydrocephalus). Partial success was achieved in the remaining two patients. One year after the first procedure, in one of these two patients (Case 1), occlusion of the cystoventriculostomy was diagnosed based on MR imaging evidence of progressive enlargement of the cyst and the ab-

![Image](image1.png)

**Fig. 1.** Case 5. Preoperative MR images obtained in the patient at 2 months of age demonstrating sagittal (A) and axial (B) views of a right interhemispheric parietooccipital cyst. Follow-up sagittal (C) and axial (D and E) MR images obtained in the patient at the age of 6 months. The cyst has significantly increased in volume, with anterior displacement of the basal ganglia. Arrows show the areas of endoscopic fenestration between the cyst and the quadrigeminal cistern (C) and the right ventricle (D). Postoperative axial (F and G) and coronal (H) MR images obtained in the patient at 7 months of age, after endoscopic fenestration. Note the significant decrease of the cyst volume and the large area of communication between cyst and ventricular cavity (H).

![Image](image2.png)

**Fig. 2.** Case 4. A: Axial CT scan obtained in the patient at 4.5 years of age, revealing a large interhemispheric cyst with agenesis of the corpus callosum. B: Axial MR image obtained in the patient at the age of 13 years, demonstrating mild enlargement of the cyst. C: Repeated MR image obtained in the patient at the age of 13 years, revealing a herniation of the cyst through the tentorial hiatus (right) with consequent compression and occlusion of the aqueduct (left). D: Postoperative MR image obtained in the patient 15 months after surgery, demonstrating a large communicating ventricular system. E: Repeated MR image obtained in the patient 15 months after surgery, revealing that the cyst herniation into the quadrigeminal cistern has resolved (right) and the aqueduct is open with good flow artifact (left).
sence of flow void signs. A repeated endoscopic procedure was successfully performed (follow up 36 months). In the other patient (Case 5), an LP shunt was inserted following the initial endoscopic procedure to treat a persistent subcutaneous CSF collection above the bur hole. The shunt was successfully removed 8 months after insertion without recurrence of the pseudomeningocele. In the three patients with preoperative hydrocephalus, reduction in the size of the cyst allowed for resolution of aqueductal compression (Cases 3 and 6) and opening of the proximal inlet (Case 3).

Symptoms and signs improved in all cases. In particular, in the patient with preoperative symptoms and signs of raised ICP (Case 2) symptoms completely resolved after surgery. In the patients with progressive macrocrania (Cases 2, 3, and 7) head circumference slowly diminished as measured using a standardized instrument. Regarding intraoperative complications, only one patient experienced minor venous bleeding from the edges of the stoma, which was easily controlled with irrigation and monopolar coagulation. Subdural collection of CSF developed in three patients (Cases 3, 4, and 7) and was managed conservatively in two (Cases 3 [Fig. 3] and 6 [Fig. 4]). In another patient (Case 4), a bloody subdural collection was detected following a postoperative seizure. This was managed with a subdurapertitoneal shunt, which was removed 4 months later. A subcutaneous CSF collection that developed in one patient (Case 5) was managed initially with lumbar punctures and then with the insertion of an LP shunt, which was removed a few months later.

Follow-up imaging showed decreased cyst volume and ventricle size in all patients; in four patients (Cases 1, 3, 5, and 7), the decrease of cyst volume was more significant. Injection of intrathecal dye was not given to any of the patients. Sufficient noninvasively collected evidence of procedural success included endoscopic confirmation of large areas of communication between cysts and cisterns; follow-up imaging studies showing decreasing cyst volume and, if it was present preoperatively, decreasing ventricular dilation; and improvement and/or resolution of the symptoms and signs originally indicating the need for the operation. Histological evaluation of the cyst wall showed arachnoid tissue in all but one patient and glioependymal tissue in the remaining patient (Case 3).

Six patients underwent psychomotor testing for evaluation of neurodevelopmental outcome at a mean age of 70.6 months (range 15 months–14 years). The mean interval between surgery and testing was 27.6 months (range 8–52 months). The results are shown in Table 1. Three patients exhibited normal intelligence (total IQ score > 80), two exhibited mild developmental delay (total IQ score range 50–80), and one had severe developmental delay (total IQ score < 50).

### Illustrative Cases

**Case 1**

**History and Examination.** An intracranial fluid-filled cavity was diagnosed at 34 weeks of gestational age in an otherwise normal male fetus. Delivery was by cesarean section at 40 weeks of gestational age. At birth, the patient had a tense fontanelle and head circumference of 36.5 cm. A CT scan on Day 2 revealed an extremely large left parietal arachnoid cyst with significant compression of the left frontoparietal lobe (Fig. 5A–I). The fontanelle remained tense, and head circumference increased rapidly to 38.5 cm during the 1st week of life.

**Operation and Postoperative Course.** The patient underwent surgery at the age of 9 days. With entry through a left parietal bur hole, the deep layer of the cyst was largely flattened into the quadrigeminal cistern. When the patient was 22 days of age, CT scanning showed significant reduction of the cyst volume (Fig. 5C and D). The neonatal period was otherwise uneventful, but follow-up CT scanning when the boy was 4 months of age revealed regrowth of the cyst (Fig. 5E and F); this was confirmed on MR imaging performed 5 months later. The patient then underwent a repeated operation at the age of 8 months. Via the same parietal approach, endoscopic resection of large fragments of the cyst wall and large fenestration of the distorted quadrigeminal and interhemispheric cistern were performed. Follow-up MR imaging performed 42 months after the second procedure showed significant reduction of the cyst volume and agenesis of the posterior half of the corpus callosum (Fig. 5G–I).

**Follow-Up IQ Testing.** Psychomotor evaluation was performed when the child was 5 years of age, using the Wechsler Preschool and Primary Scale of Intelligence. It showed a total IQ score of 87, a verbal IQ score of 95, and a performance IQ score of 80.

**Case 3**

**History and Examination.** In this 51-month-old boy with apparently normal psychomotor development, a macrocrania (57.5 cm) was diagnosed during a routine pediatric examination. An MR imaging study revealed a large right
and interhemispheric frontal cyst with agenesis of the corpus callosum and significant mass effect on the contralateral frontal lobe (Fig. 3A and B). Neuropsychiatric evaluation revealed developmental delay, with a performance level of 36 months.

**Operation and Postoperative Course.** The child underwent endoscopic surgery at the age of 51 months. Entry was through a right frontal bur hole, and cystoventriculostomy and third ventricle cisternostomy were performed without incident. The postoperative period was characterized by the onset of right partial seizures that were well controlled by phenobarbital (50 mg/day). Postoperative CT scanning performed on Days 3 and 10 revealed right subdural hemispheric hygroma. Placement of a subduroperitoneal shunt was proposed, but the child’s parents refused further surgery and the patient was discharged against medical advice. He was reevaluated at the age of 65 months. At that time, MR images showed significant reduction of the cyst volume, reduced ventricular dilation, and right frontal hygroma with no mass effect. No flow was visible through the open stoma of the third ventriculostomy, probably because of dense arachnoid adhesions at the level of the preopticine cistern, but good flow artifact was visible through the aqueduct (Fig. 3C and D).

**Follow-Up IQ Testing.** Psychomotor evaluation was performed using the Wechsler Preschool and Primary Scale of Intelligence test when the child was 73 months of age. The test revealed a total IQ score of 59, a verbal IQ score of 67, and a performance IQ score of 57. At that time, the child’s seizures were still being controlled using phenobarbital.

**Case 5**

**History and Examination.** In this 7-month-old boy a prenatal diagnosis of cystic malformation of the brain was established. Neonatal ultrasonography showed corpus callosum agenesis and a right parietooccipital cyst in the interhemispheric fissure. The diagnosis had been confirmed on MR imaging when the child was 2 months of age (Fig. 1A and B). When he was 6 months of age, repeated MR imaging showed a significant increase of the cyst volume causing mass effect on the right ventricle and basal ganglia (Fig. 1C–E).

**Operation and Postoperative Course.** The patient underwent endoscopic surgery at the age of 7 months. Large fenestrations were created between the cyst, the right ventricle (Fig. 1D arrow), and the quadrigeminal cistern (Fig. 1C arrow), which was noted because of the anatomy of the posterior aspect of the quadrigeminal plate. Subcutaneous CSF collection, which did not respond to local tapping and compressive head wrapping, developed at the site of the bur hole. An LP shunt was therefore implanted 2 weeks after the endoscopic procedure to allow rapid resolution of the fluid collection. The shunt was clamped when the child was 15 months of age and removed 4 days later. We observed no clinical consequences during the first 2 months after shunt removal. Follow-up MR imaging performed (Fig. 1 F–H) after shunt removal showed significant decrease of the cyst volume, resolution of the mass effect, and a large area of communication between the cyst and the lateral ventricle. The patient was able to ambulate at 15 months.

**Follow-Up Psychomotor Testing**

When the child was 17 months of age, his developmental status was evaluated using the Brunet–Lezine Scale of Psychomotor Development. The test revealed a developmental age of 14 months 7 days, a postural age of 13 months 15 days, a behavioral age of 14 months 12 days, a language age of 15 months, and a social age of 15 months.

**Discussion**

Interhemispheric cysts are congenital malformations usually associated with other midline neurodevelopmental disorders such as corpus callosum agenesis. Disagreement about their classification and their effects on CSF dynamics persists in the literature.3,16,18,19,24

The seven cases of interhemispheric cysts discussed in the present report were quite homogeneous and can be included in the group of extraxial midline interhemispheric cysts according to the classification system proposed by Mori.18 The only exception would be the lesion described in Case 4, in which the cyst, although located in the midline and associated with corpus callosum agenesis and bilateral extension, could not be defined as strictly extraxial.

Interhemispheric arachnoid cysts can distort the CSF pathways, leading to ventricular enlargement that is often asymmetrical.18 They are usually very large when discovered, but they generally cause mild clinical symptoms. Although these cysts can be incidentally discovered prenatal-
ly (Fig. 4A), they are usually found in association with clinical symptoms such as macrocrania, headaches, epileptic seizures, and psychomotor retardation. These symptoms can also be caused by frequently associated malformations such as corpus callosum agenesis, gyral abnormality, and neuronal heterotopia.

The paucity of clinical symptoms in infants and children harboring interhemispheric cysts can make the determination of appropriate surgical approach and the choice of an appropriate time for intervention difficult. For patients with progressive signs of raised ICP, surgery is indisputably indicated. The indication for surgery is less unequivocal in patients with epilepsy, headache, or psychomotor retardation because a causal relation between the cysts and the symptoms is often difficult to ascertain. For all of the patients in our study, the significant volume of the cyst and the importance of mass effect on the brain were determinants for surgery, and significant decreases in volume were observed in all cases. In general, asymptomatic young patients for whom conservative treatment is chosen require close medical and neuroimaging follow up until the developmental course is evident.

Controversy exists regarding surgical treatment. The available options are craniotomy and open surgery, endoscopic approaches, and placement of extrathecal shunts. The use of shunts to drain cysts has been proposed as the optimum treatment by Lena, et al., and Mori. This treatment results in low morbidity and mortality rates, but there is a high incidence of failures due to secondary occlusion, inadequate drainage, and infection.

Craniotomy permits wide excision of the cyst lining and the establishment of free communication between the cyst and the subarachnoid space of the interhemispheric fissure. Caldarelli and Di Rocco undertook open surgery as the first-line treatment in 16 children with interhemispheric cysts. They reported an absence of death and major morbidity, and only two patients required a second operation. Based on this experience, they recommended craniotomy, cyst membrane excision, and creation of areas of communication with the subarachnoid cisternal spaces and/or the ventricular system as first-line treatment of interhemispheric arachnoid cysts.

Endoscopic treatment of arachnoid cysts has been reported increasingly in the last decade, but the authors of most series have focused on patients with middle fossa or suprasellar cysts in whom endoscopic procedures have a success rate of 71 to 81% and are associated with minimal morbidity. To the best of our knowledge, however, no published series on endoscopic procedures have involved interhemispheric cysts. In our series of seven patients with interhemispheric cysts associated with corpus callosum agenesis, complete success (defined as control of cyst size and associated hydrocephalus without the placement of a shunt) was achieved in five patients (71%) after a single endoscopic procedure. One patient (14%) underwent a second endoscopic procedure that was successful 1 year later due to closure of the stoma. The remaining patient (14%) required implantation of an LP shunt for a persistent subcutaneous CSF collection over the bur hole.

In our experience, endoscopic treatment of interhemispheric cysts is less invasive than microsurgery and offers a shorter recovery period for the patient. Nevertheless, complications related to reassessment of CSF circulation after opening the sites of large fluid collection are to be expected. The endoscopic procedure can be difficult because of the distorted anatomy and the associated risk of disorientation for the surgeon. Major vessels of the basal cisterns, pericallosal arteries, and choroid plexus can be useful landmarks.

![Fig. 5. Case 1. A and B: Preoperative CT scans obtained in the patient at the age of 2 days, showing a large interhemispheric cyst. C and D: Postoperative CT scans acquired 15 days after endoscopic fenestration, demonstrating significant reduction in cyst volume and expansion of brain parenchyma. E and F: Follow-up CT scans obtained in the patient at the age of 4 months, before the second endoscopic fenestration, revealing regrowth of the cyst. G and H: Follow-up MR images obtained 42 months after the second endoscopic fenestration, showing axial (G and H) and sagittal (I) views—the cyst volume has diminished and is stable. Agenesis of the posterior half of the corpus callosum is visible.](image-url)
Preoperative neuroimaging investigations, in particular MR imaging with DRIVE T₂-weighted sequences and CSF flow studies, should be carefully evaluated to detect the thinner point of the cyst walls where a stoma can be created with minimal brain damage. Neuronavigation can be extremely helpful in placing bur holes on the ideal trajectory and guiding the endoscope through the target, but it was not available at our institutions at the time the patients were treated. Postoperative imaging is essential to assess the patency of both the stomas and the subarachnoid spaces into which the CSF is diverted following the endoscopic procedure. Imaging is important to detect possible complications related to the rapid decrease of the cyst volume, such as the subdural hygromas (Fig. 6A–C) that were observed in two cases and required placement of a subduroperitoneal shunt in one. Long-term follow-up imaging (12–24 months) is mandatory to guarantee the decrease in the cyst volume, which in most cases is very slow (Fig. 6A–E). Because the procedure may need to be repeated, multiple endoscopic procedures should be considered before pursuing alternative treatments. The indications for additional intervention depend on the persistence of the patient’s symptoms and the progressive enlargement of the cyst as seen on follow-up imaging. In one patient (Case 1), the cyst began to regrow 1 year after the endoscopic cystocisternostomy, and neuroimaging showed disappearance of the flow artifact through the stoma. Repeated endoscopy was successfully performed, and the cystocisternostomy was found to be obstructed by scar tissue.

As a result of thin cerebral mantles, total collapse of a cyst never occurred in any of our patients after treatment. However, a satisfactory clinical improvement occurred despite only moderate or slight reduction in the volume of the cysts, which has also been reported in other series concerning endoscopic management of arachnoid cysts.²,³

**Conclusions**

Endoscopic treatment of interhemispheric cysts allows surgeons to modify CSF dynamics by creating areas of communication between the cyst and the ventricular system, the cyst and the subarachnoid space, or both. In such cases shunts are not needed, and open surgery–related morbidity is avoided.

Our results suggest that endoscopic procedures should be considered the first-line option in the treatment of such lesions, even if some complications are to be expected, such as subdural collections due to thinness of the cerebral mantle or subcutaneous CSF collections due to hydrocephalus that is often caused by many different factors.

**References**


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