Clinical Case Reports

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Symptomatic Choroidal Fissure Arachnoid Cyst: Treatment by Endoscopic Fenestration

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Background: Choroidal fissure cysts are usually incidental imaging findings and are typically benign, although in rare cases they may cause intracranial hypertension. The formation of cysts in this location is related to abnormal development of the choroid tela and the choroidal fissure. Approximately 20 cases have been reported in the literature.

Case presentation: A 3-month-old patient with a small choroidal fissure cyst at birth presented with acute symptoms of intracranial hypertension, nausea, and vomiting. Over just two weeks, progressive enlargement was documented with serial ultrasounds, reaching a preoperative size of 50 x 35 x 30 mm. The patient underwent endoscopic fenestration of the cyst, resulting in complete resolution of clinical symptoms in the early postoperative period and marked reduction in cyst size on imaging (36 x 21 x 24 mm) one day after surgery. At two-month follow-up, the cyst measured 28 x 21 x 19 mm. Symptomatic choroidal fissure cysts are exceptionally rare, with only eight clinical cases reported to date in the literature. Traditionally, treatment has consisted of cystoperitoneal shunting. We currently believe that endoscopic treatment can be offered as a first-line option, achieving complete clinical resolution without evidence of complications.

Conclusion: Symptomatic choroidal fissure cysts are an exceptionally rare pathology. Treatment by endoscopic fenestration provides excellent clinical and radiological resolution without additional short-term complications.

Keywords: arachnoid cyst, choroidal fissure, endoscopic fenestration, pediatric neurosurgery.

INTRODUCTION

The choroidal fissure is a cleft located between the fornix and the thalamus, along which the choroid plexus is attached [1]. It is a channel located adjacent to the temporal horn, separated from it by a layer called the choroidal tela. The choroidal fissure cyst (CFC) is a rare embryonic entity characterized by cysts containing cerebrospinal fluid (CSF) at the level of the choroidal fissure.

The formation of a CFC results from abnormal development of the choroidal tela and the fissure itself [2]. Several theories have been proposed to explain the mechanism underlying the development of primary choroidal cysts:

1. as a result of abnormal splitting and duplication of the arachnoid membrane, as proposed by Starkman[3] et al and Krawchenko and Collins[4] et al;

2. as a consequence of temporal lobe agenesis, leading to cyst formation within the subarachnoid space [5]; and

3. from invagination of the vascular mesenchyme of the primitive choroid plexus into the adjacent brain, acquiring an external glial tissue covering [6].

CFCs are usually incidental findings on imaging studies. They are considered benign lesions that rarely produce symptoms, although in some cases they may cause morbidity[7].

CASE REPORT

The patient is a 3-month-old male infant, born at term via spontaneous vaginal delivery, with an uneventful perinatal course. Apgar scores were 8 and 9 at 1 and 5 minutes, respectively. Birth weight was 3,200 g, and head circumference was 34 cm. The infant demonstrated normal developmental milestones for age prior to presentation. No history of seizures, feeding difficulties, or neurological deficits was noted before symptom onset.

At presentation, the infant exhibited acute signs of intracranial hypertension, including recurrent vomiting, irritability, and marked lethargy. On examination, the anterior fontanelle was tense and bulging, cranial

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circumference was 42 cm (above the 97th percentile), and neurological assessment revealed mild hypotonia but otherwise preserved reflexes. Vital signs were stable, with no evidence of systemic illness.

Interval imaging included transfontanellar ultrasound and MRI, documenting rapid enlargement of a left temporal choroidal fissure cyst from 15 mm at birth to 50 × 35 × 30 mm over a two-week period. Imaging demonstrated compression of the temporal horn of the lateral ventricle and mild perilesional vasogenic edema (Figure 1). Surgical Intervention: Endoscopic fenestration was performed via a left temporal burr hole (Figure 2). The endoscopic trajectory was carefully planned using preoperative MRI to avoid eloquent cortical regions.

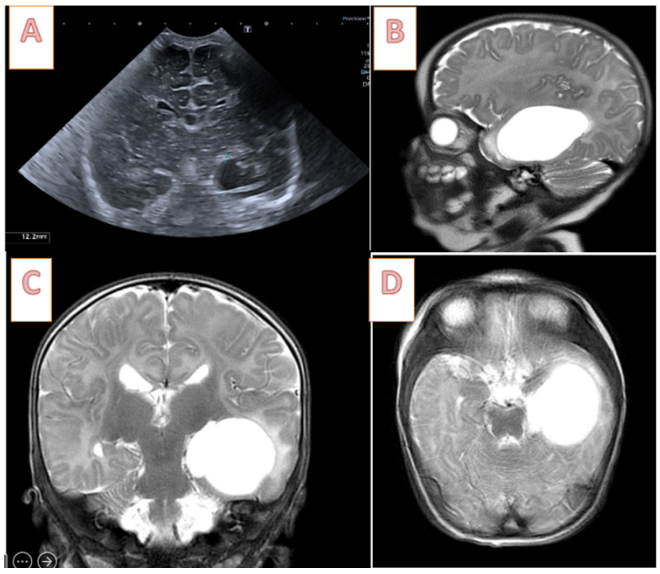

Figure 1. Preoperative images. (A) Initial transfontanellar ultrasound on September 9, 2024: an extra-axial cyst measuring 15 mm is visualized in the left temporal fossa, compatible with an arachnoid cyst. (B–D) Sagittal, coronal, and axial MRI scans on December 4, 2024 (T2 FSE PROPELLER sequence) showing enlargement of the left temporal cystic structure (5 × 3.5 × 3 cm) compared with the previous ultrasound, currently suggesting entrapment of the temporal horn of the left lateral ventricle. Vasogenic edema is observed in the perilesional white matter.

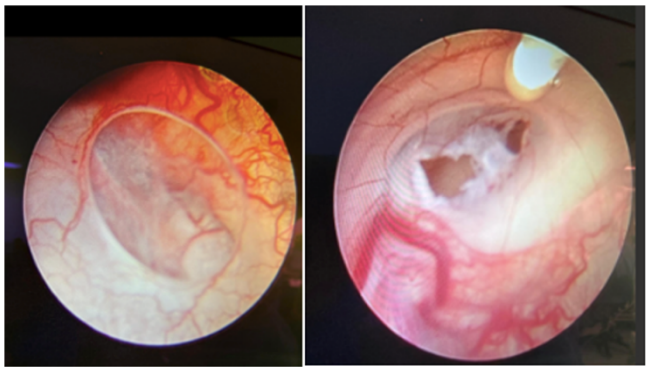

Figure 2. Intraoperative images showing the cyst before and after endoscopic fenestration.

Anatomical landmarks included the lateral ventricle floor and choroidal fissure margin. A fenestration was created from the cyst into the lateral ventricle, establishing a permanent CSF pathway. Intraoperative findings included clear CSF-like fluid within the cyst, and the cyst wall was thin and translucent. Samples of the cyst lining were sent for histopathological examination, which confirmed arachnoid cyst tissue without atypia.

Follow-up and Outcome: Postoperatively, the patient was followed closely with serial clinical evaluations and imaging studies. Early postoperative transfontanellar ultrasound showed a reduction of the cyst to 36 × 21 × 24 mm, (Figure 3 and at two months, MRI demonstrated further decrease to 28 × 21 × 19 mm (Figure 3. Clinically, the patient remained asymptomatic, feeding normally, with normal tone and reflexes. Head circumference followed an age-appropriate trajectory, measuring 43 cm at two months postoperatively, and no seizure activity was observed.

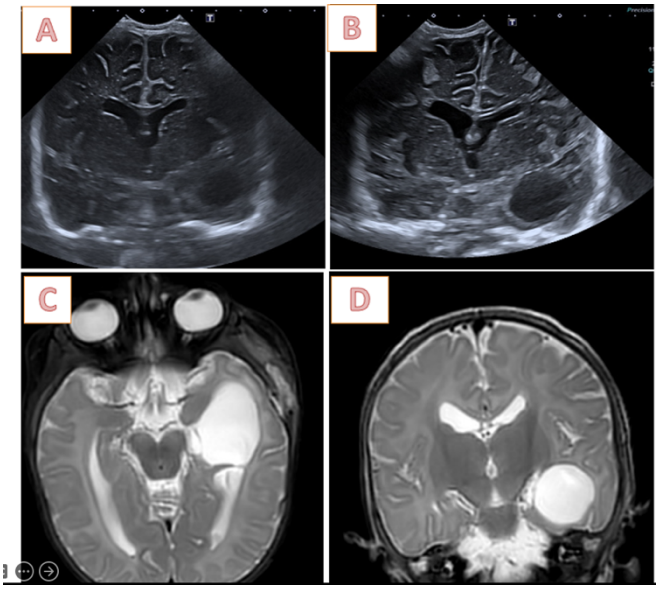

Figure 3. Postoperative images. (A) First intraoperative transfontanellar ultrasound showing a marked reduction in the size of the left temporal cystic lesion compared with the previous MRI. The current measurement is 3.6 × 2.1 × 2.4 cm (AP × T × CC). (B) Second intraoperative transfontanellar ultrasound showing further reduction in cyst size compared with the previous ultrasound, measuring 3.2 × 2.1 × 2.1 cm (AP × T × CC). (C–D) Postoperative MRI (axial and coronal cuts, T2 FSE PROPELLER sequence) demonstrating a decrease in the size of the cystic lesion closely related to the left temporal lobe, as well as reduction of the edema in the white matter of the temporal pole, with maximum diameters of 3.4 × 2.3 × 2.3 cm.

Given the congenital nature of the lesion and the patient's age, two months represents a relatively short follow-up interval. Long-term neurodevelopmental outcomes, seizure surveillance, and shunt-free survival beyond this period remain to be fully assessed. The early results, however, indicate complete resolution of symptoms, significant radiological improvement, and normal neurodevelopment for age. These limitations are acknowledged, and continued monitoring is planned to

Table 1. Approximately 20 cases of CFC have been reported in the literature. The table also presents the main clinical features and whether conservative or surgical treatment was applied, among other details. Note how the use of endoscopic fenestration as a treatment approach has increased in recent years. VP = ventriculoperitoneal.

Study	Patients (n)	Age (years)	Main symptoms	Surgery	Outcome / Follow-up
Morioka et al., 1994 [10]	2	32; 41	Complex partial seizures	No initial surgery	Controlled with antiepileptics; seizure reduction
Arroyo & Santamaria, 1997 [11]	9	12–31	Partial seizures	No surgery	Controlled with medication
Millichap, 1997 [12]	1	4	ADHD / headache	No surgery	Controlled with medication
Sherman et al., 2006 [13]	1	Variable	Variable	No surgery	Incidental findings; controlled with medication
De Jong et al., 2011 [9]	6	8–62	Asymptomatic, incidental finding	No surgery	Stable during follow-up (up to 10 years)
Chitkara et al., 2011 [14]	1	Newborn	Panhypopituitarism, hydrocephalus	Shunt	Later death due to endocrine complications
Karataş et al., 2016 [15]	1	35	Headache, dizziness, mild visual deficit	Microsurgical fenestration	Complete improvement, no recurrence
Weaver et al., 2017 [16]	2	5	Progressive neurological deficits	Endoscopic fenestration	Good postoperative outcome
Achour et al., 2020 [17]	2	8 (female); 9 (NR sex)	Temporal lobe epilepsy (1); progressive neurological deficits (1)	No surgery (1); endoscopic fenestration (1)	Complete control with medication (1); good postoperative outcome (1)
O'Halloran et al., 2020 [18]	1	Adult	Dorsal pain, spinal symptoms	Surgery + shunt	Partial improvement
Marquez Yamila, 2022–2023 [19]	1	0.025 (9 days)	Hydrocephalus, irritability	Fenestration + VP shunt	Clinical improvement, mild residual motor delay

ensure sustained clinical stability and optimal neurodevelopment. The written informed consent for publication (including images) was obtained from the patient's legal guardian.

DISCUSSION

A comprehensive literature search was conducted to identify all reported cases of symptomatic choroidal fissure cysts (CFCs) and their management. The following electronic databases were searched: PubMed, Scopus, Web of Science, and Embase. The search period included all articles published up to December 2024. The search strategy combined terms related to the pathology, including:"choroidal fissure cyst", "arachnoid cyst", "endoscopic fenestration" or "pediatric neurosurgery" The inclusion criterio are case reports or case series reporting patients with CFCs.

All identified articles were independently screened by two authors based on titles and abstracts. Full texts of potentially relevant articles were reviewed to extract the following data: patient age and sex, clinical presentation, imaging characteristics, treatment modality, and postoperative outcome. Discrepancies between reviewers were resolved by consensus. The extracted data were summarized qualitatively, focusing on the rarity of symptomatic cases and the outcomes of endoscopic fenestration versus other surgical approaches. This methodology ensures transparent and reproducible synthesis of the literature, supporting the conclusions drawn in the discussion.

Very few cases have been reported in the literature. Most describe small, asymptomatic cysts incidentally discovered on imaging studies, while a minority of patients present with seizures or other neurological symptoms [8–9]. Imaging modalities such as CT and MRI are essential for differentiating CFCs from other cystic lesions, including cystic tumors, dermoid or epidermoid cysts, and enlargement of the choroidal fissure secondary to focal temporal lobe atrophy [9]. CT typically shows a well-defined,

homogeneous, low-density lesion with attenuation similar to CSF, without calcification or contrast enhancement. MRI demonstrates signal intensity identical to CSF on all sequences, thin cyst walls, and no surrounding edema or gliosis. Coronal images are particularly useful for delineating the relationship of the cyst to the choroidal fissure [3]. The definitive diagnosis is established through histopathological examination.

A literature review identified approximately 20 cases of temporal CFCs, showing a slight right-sided predominance (60%), with seizures as the main presenting symptom in 65% of patients. Most cases were managed conservatively, and surgical intervention was rarely indicated (table 1).

Historically, it is worth noting that Sherman[20] et al reported in 1989 a radiological analysis of these lesions in 26 patients with cysts located in or near the temporal choroidal fissure, including two bilateral cases. Only five patients presented with seizure disorders, none of which correlated electroencephalographically with the cyst's location. Similarly, Arroyo and Santamaria[11] et al described nine CFCs among 17 patients with arachnoid cysts, suggesting that these lesions often represent incidental findings unrelated to the seizure focus. Millichap[12] et al reported a CFC in three patients who presented with ADHD and headache, recommending neuropsychological evaluation to detect potential associated cognitive deficits.

Based on these findings, majority of cysts are asymptomatic and are managed conservatively, reserving surgical intervention for cases presenting with mass effect, seizures, or hydrocephalus, particularly in neonates and young children [12–15]. Available surgical options include:

1. Cystoperitoneal or ventriculoperitoneal (VP) shunting: The advantage of this technique lies in cyst decompression and relief of intracranial pressure [12,14]. Possible complications include infection, obstruction, overdrainage, and the need for multiple revision surgeries [12].

2. Microsurgical fenestration: This approach creates a communication between the cyst and the ventricles or the subarachnoid space [12]. It requires a craniotomy and cortical manipulation, with inherent risks of neurological injury and hemorrhage [12].

3. Endoscopic fenestration (minimally invasive): This minimally invasive approach minimizes postoperative morbidity [12,14]. It allows direct access to the cyst through small cranial openings, enables the creation of a permanent communication with the lateral ventricles or subarachnoid space [12], and reduces or eliminates the need for shunt placement [12,15].

However, it carries a risk of premature closure of the stoma, particularly in neonates or in cysts with thick, highly vascularized capsules [12]. The procedure requires advanced endoscopic experience and precise preoperative imaging planning [12,15].

Endoscopic fenestration has become a first-line surgical approach to avoid shunt-related complications such as infection, obstruction, hemorrhage, or overdrainage [16]. However, the thickness of the cyst wall, its vascularity, and the young age of the patient may contribute to early stoma closure, which in some cases requires subsequent shunt placement. Historically, shunting was considered the standard treatment, and placement of a catheter into a subcutaneous reservoir without endoscopic communication was an alternative when shunting was not feasible.

Currently, endoscopic fenestration is recommended as the preferred first-line approach, reserving shunting for cases of failed or insufficient fenestration [14]. In this 3-month-old patient, the decision to perform endoscopic fenestration was based on the close anatomical relationship between the cyst and the temporal horn. The location of the cyst within the choroidal fissure allowed for a direct endoscopic trajectory, facilitating communication between the cystic content and the ventricular system, while leveraging the natural pulsatile gradients of the CSF to ensure long-term stoma patency.

This surgical choice is particularly critical in the neonatal and infant population, where the primary goal is to avoid shunt dependency. Infants face a significantly higher risk of valve-related complications, such as infections, mechanical obstructions due to somatic growth, and the need for multiple surgical revisions throughout their lives. In this context, endoscopy offers a minimally invasive solution that preserves physiological CSF dynamics.

However, it is important to note that although endoscopic fenestration offers clear advantages in terms of reduced morbidity, it cannot be categorically termed the sole 'gold standard' given the limited evidence base. The low incidence of symptomatic CFCs precludes large-scale comparative studies. Therefore, while endoscopy is a highly promising first-line option, microsurgery remains a valid alternative in cases of complex anatomy or significantly thickened cyst walls, and cystoperitoneal shunting remains a rescue option if fenestration fails or if there is underlying communicating hydrocephalus.

The literature supports these observations. Weaver[16] et al reported favorable postoperative outcomes following endoscopic fenestration of brainstem CFC [13]. The most recent case (2022–2023) involved a 9-day-old infant with a giant supratentorial cyst, successfully treated with combined endoscopic fenestration and VP shunt placement, resulting

in clinical improvement with mild residual motor delay [15].

CONCLUSION

In conclusion, endoscopic fenestration is currently considered the first-line treatment for symptomatic CFCs offering an optimal balance between efficacy and minimal invasiveness [12,13,15]. The choice of intervention should be individualized according to cyst size, location, patient age, and the presence of hydrocephalus, with regular radiological follow-up to monitor for recurrence or stoma closure [12–15].

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DISCLOSURES

Ethical approval

This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate

The patients gave consent to use their information and images for research purposes.

Conflict of interest

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper."

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Artificial intelligence

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CONTRIBUTIONS

-**Alejandra Arévalo-Sáenz**: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing
-**Fernando Rascón-Ramírez**: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Supervision, Visualization, Writing – original draft, Writing – review & editing
-**Pedro Alonso Lera**: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Supervision, Visualization, Writing – original draft, Writing – review & editing

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