Choroid Plexus Cysts Associated with Unilateral Hydrocephalus: Two Pediatric Cases and a Narrative Literature Review

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Abstract

Background: Choroid plexus cysts (CPCs) are commonly incidental prenatal findings, whereas intraventricular cysts associated with obstruction of the foramen of Monro represent an uncommon neurosurgical presentation. The distinction between an incidental fetal CPC and a persistent obstructing cyst is clinically important.

Case presentation: Two children with unilateral hydrocephalus and cysts attached to the choroid plexus at the foramen of Monro are described. Case 1, a 2-year-old girl, presented with headache, vomiting and irritability consistent with intracranial hypertension due to left-sided hydrocephalus; MRI showed a 1.3-cm cyst at the left foramen of Monro. Case 2, a 2-month-old boy, was clinically asymptomatic; the cyst, 1.5 cm in greatest diameter, was detected antenatally and MRI showed right-sided hydrocephalus. Both had antenatal unilateral ventriculomegaly and underwent neuroendoscopic cyst fenestration combined with septostomy. Intraoperatively, the cyst wall was thin and attached to the choroid plexus in both patients, and no specimen was obtained for histology. Case 2 was operated on to prevent decompensation with intracranial hypertension.

Outcome: Both patients had an uncomplicated postoperative course and were in good condition at discharge, without shunt placement or repeat endoscopy; signs of intracranial hypertension resolved in Case 1. No postoperative imaging, date of last assessment or follow-up duration is available.

Discussion: The diagnostic assessment rests on MRI and the endoscopic appearance; no specimen was obtained, so histological confirmation is not available. The two presentations contrast: acute intracranial hypertension in one child, and an asymptomatic infant with an antenatally detected cyst and hydrocephalus operated on to prevent decompensation. The absence of postoperative imaging and follow-up data prevents assessment of recurrence and durability.

Conclusion: These cases illustrate contrasting presentations of unilateral hydrocephalus associated with cysts attached to the choroid plexus at the foramen of Monro, treated endoscopically without shunt placement or repeat endoscopy in the available record. Without postoperative imaging and documented follow-up, long-term shunt independence, absence of recurrence and superiority over alternative management cannot be established.

Keywords: choroid plexus cyst; unilateral hydrocephalus; foramen of Monro; neuroendoscopy; septostomy; pediatric neurosurgery.

1. Introduction

Choroid plexus cysts (CPCs) are frequently encountered during prenatal ultrasonography and often resolve during gestation. Their prenatal significance depends on the complete fetal assessment, associated structural findings and aneuploidy screening results [1–3]. These incidental findings should not be conflated with persistent intraventricular cysts that obstruct cerebrospinal fluid (CSF) circulation and present to a neurosurgical service.

Although uncommon, cysts associated with the choroid plexus may obstruct the foramen of Monro or other ventricular pathways and cause acute, progressive or intermittent hydrocephalus [4,5]. The published surgical literature consists mainly of individual reports and small series, with heterogeneous locations, interventions and follow-up [6]. Accordingly, favorable results in selected reports do not establish a uniform indication for surgery or the superiority of a particular procedure.

We describe two children with unilateral hydrocephalus and cystic lesions at the foramen of Monro, managed by neuroendoscopic fenestration and septostomy. Their contrasting clinical presentations are considered alongside a narrative review of diagnostic assessment, mechanisms of obstruction and the rationale for individualized treatment. Both had prenatal unilateral ventriculomegaly; in Case 2 the cyst itself was also detected antenatally.

2. Methods

This descriptive case series reports the two patients who underwent surgery in our Department of Neurosurgery in 2025. No case selection was applied: both were the consecutive eligible patients treated in this period. Clinical characteristics, neuroimaging findings and surgical procedures were retrospectively reviewed by the authors using medical records and imaging archives. Exact dates of presentation, imaging and surgery are not reported.

A narrative literature search was performed in PubMed [and Google Scholar / Embase] using the terms “choroid plexus cyst” AND (“hydrocephalus” OR “foramen of Monro” OR “neuroendoscopy” OR “endoscopic fenestration”), supplemented by “fetal choroid plexus cyst” for prenatal findings. Articles were selected by the authors for relevance; reference lists of retrieved articles were also screened.

3. Case presentation

3.1. Case 1 — acute presentation in a 2-year-old girl

A 2-year-old girl with no significant medical history presented with a 3-day history of persistent headache, recurrent vomiting, and marked irritability, suggestive of acute intracranial hypertension. A third-trimester prenatal ultrasound had reportedly revealed isolated left-sided ventriculomegaly; however, no postnatal imaging follow-up had been performed before the onset of symptoms.

On admission, the patient was conscious and hemodynamically stable. Clinical examination revealed signs of raised intracranial pressure without focal neurological deficits; intracranial hypertension was diagnosed on clinical grounds (history and examination) and attributed to the hydrocephalus. Brain MRI was reported to demonstrate hydrocephalus involving the left lateral ventricle, associated with a cystic lesion, 1.3 cm in greatest diameter, at the ipsilateral (left) foramen of Monro and attached to the choroid plexus. The third ventricle and contralateral lateral ventricle

were described as normal in caliber, with no associated parenchymal abnormalities (Figure 1).

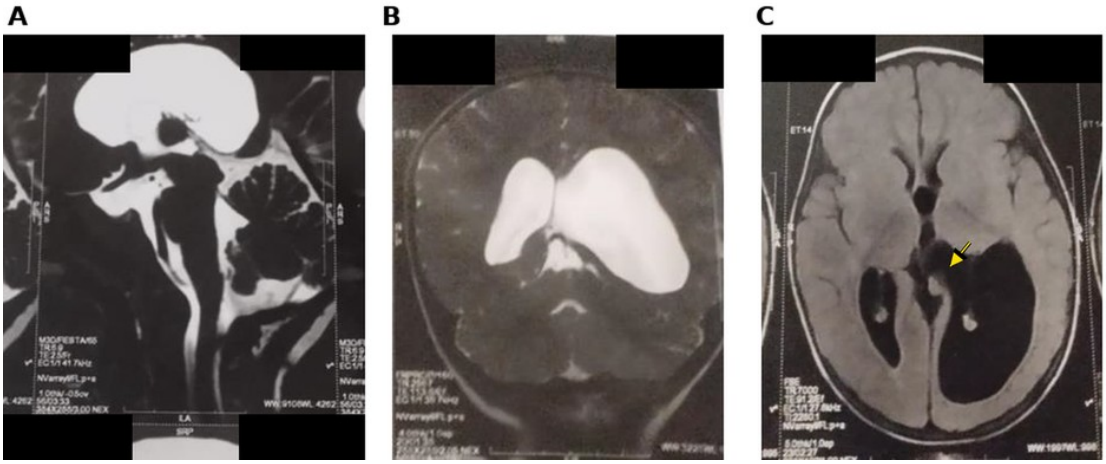


Figure 1. Case 1: preoperative brain MRI showing left-sided hydrocephalus. A, sagittal 3D FIESTA; B, coronal T2-weighted; C, axial FLAIR. The arrow in C indicates the thin cyst wall obstructing the left foramen of Monro. Examination date and patient identifiers have been removed.

The patient underwent neuroendoscopic cyst fenestration combined with septostomy. Intraoperatively, a translucent, thin-walled cyst filled with clear fluid and attached to the choroid plexus obstructed the left foramen of Monro. Fenestration was followed by septostomy to establish communication between the lateral ventricles (Figure 2). The cyst wall was not sampled; therefore, no histological result is available. The postoperative course was uncomplicated, the patient was in good condition at discharge, signs of intracranial hypertension resolved, and no additional CSF diversion procedure was required.

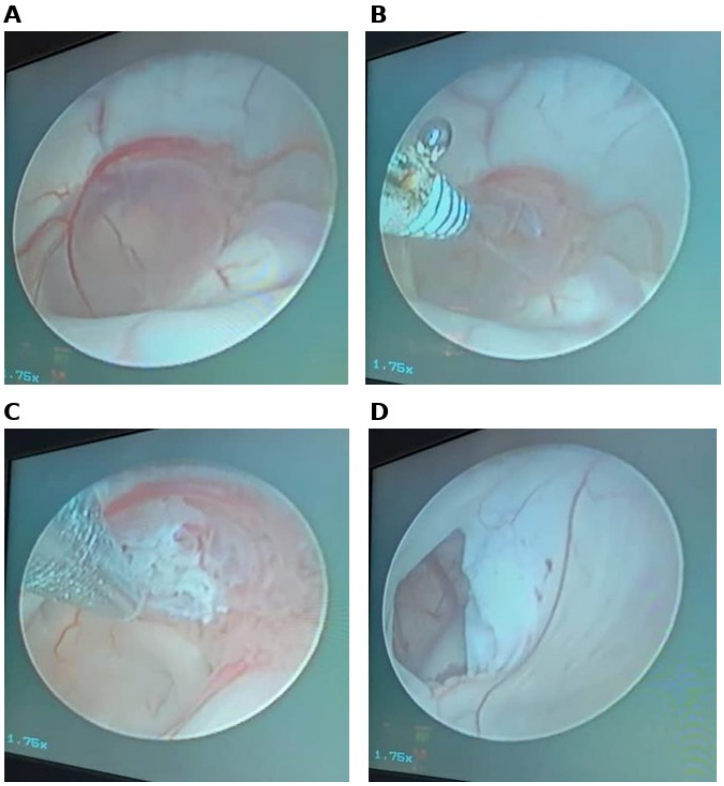


Figure 2. Case 1: intraoperative endoscopic images (A–D), arranged in the order supplied, showing the thin-walled cyst attached to the choroid plexus (A) at the left foramen of Monro, the fenestration performed (B,C) and septostomy (D).

3.2. Case 2 — congenital hydrocephalus in a 2-month-old boy

A 2-month-old male infant was referred to our department for evaluation and management of congenital right-sided hydrocephalus. The abnormality had been detected antenatally during a third-trimester obstetric ultrasound, which demonstrated isolated dilatation of the right lateral ventricle; the cyst was also detected antenatally. At presentation, the infant was alert and showed no clinical signs of intracranial hypertension. Growth parameters and neurodevelopment were reported as appropriate for age.

Brain MRI revealed a cystic lesion, 1.5 cm in greatest diameter, at the right foramen of Monro, attached to the choroid plexus and associated with obstructive hydrocephalus confined to the right lateral ventricle. The third ventricle and left lateral ventricle were of normal caliber, and no additional central nervous system abnormalities were identified (Figure 3).

The patient underwent neuroendoscopic cyst fenestration combined with septostomy, with the aim of establishing communication between the lateral ventricles and improving CSF circulation (Figure 4). Surgery rather than observation was chosen to prevent intracranial hypertension, given the risk of decompensation in the presence of hydrocephalus on MRI; this reflects the surgeons' clinical judgement, and progression is not inferred from the single MRI reported. Intraoperatively, the cyst was attached to the choroid plexus and its wall was thin. No specimen was obtained, so no histological result is available. The postoperative course was uncomplicated, the patient was in good condition at discharge, and no CSF diversion procedure was required.

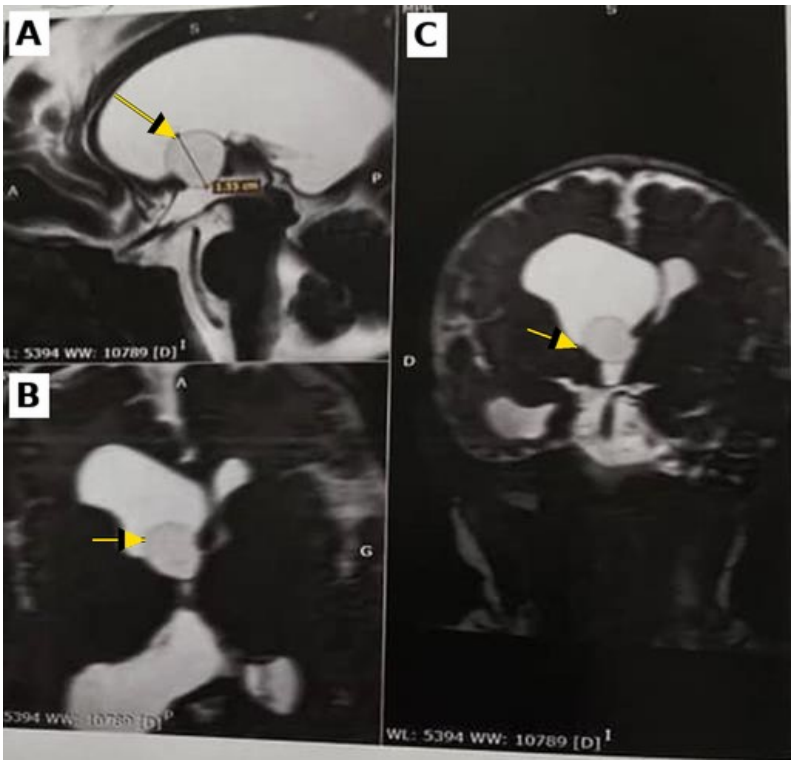


Figure 3. Case 2: preoperative T2-weighted MRI showing right-sided hydrocephalus and a cyst (arrows) at the right foramen of Monro, 1.5 cm in greatest diameter. A, sagittal view with caliper measurement; B, axial view; C, coronal view. Examination date and patient identifiers have been removed.

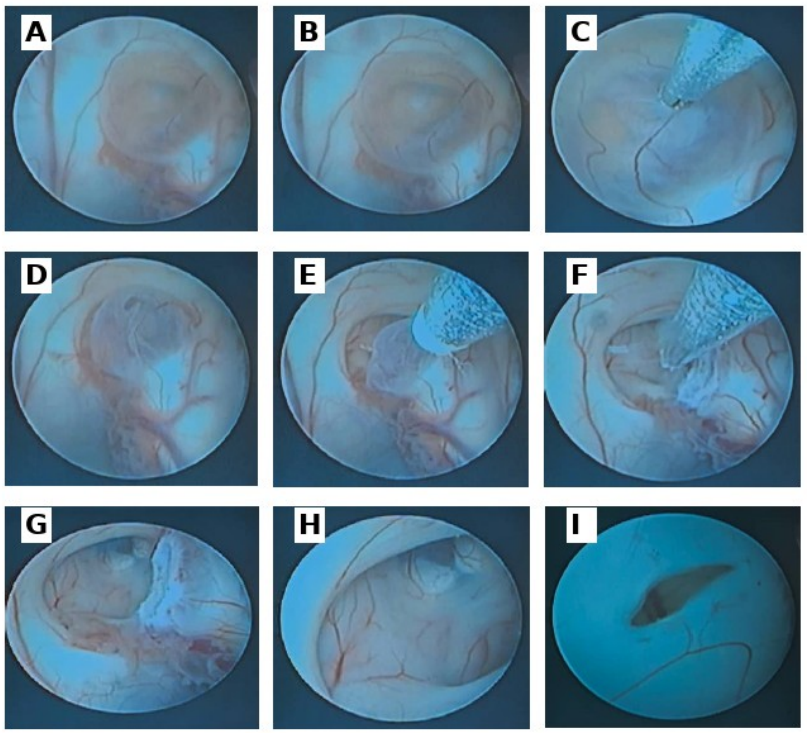


Figure 4. Case 2: endoscopic views (A–I) in the original sequence, showing the cyst attached to the choroid plexus (A,B) and the fenestration sequences (C,D,E,F,G,H) ; the last panel (I) shows the septostomy.

3.3. Postoperative outcomes and follow-up

In both patients the postoperative course was uncomplicated according to the clinical record, and both were in good condition at discharge. No shunt placement and no repeat endoscopy were required. In Case 1, signs of intracranial hypertension resolved postoperatively. No clinical recurrence or persistent obstruction was documented. No postoperative imaging was obtained, and the date of last assessment and the follow-up duration are not available; radiological recurrence or persistent obstruction therefore cannot be excluded.

Table 1. Correspondence of the two clinical observations

Characteristic	Case 1	Case 2
Age / sex	2 years / girl	2 months / boy
Antenatal finding	Unilateral ventriculomegaly (left-sided)	Right-sided ventriculomegaly; cyst detected antenatally
Presentation	3 days of headache, vomiting and irritability (intracranial hypertension)	Clinically asymptomatic; no signs of intracranial hypertension
Cyst location and size	Left foramen of Monro; 1.3 cm; attached to the choroid plexus	Right foramen of Monro; 1.5 cm; attached to the choroid plexus
Procedure	Endoscopic cyst fenestration and septostomy	Endoscopic cyst fenestration and septostomy
Histology	No specimen obtained	No specimen obtained
Postoperative outcome / imaging	Signs of intracranial hypertension resolved; no postoperative imaging	No postoperative imaging
Complications / shunt status / follow-up	No complications; no shunt or repeat endoscopy; follow-up duration not available	No complications; no shunt or repeat endoscopy; follow-up duration not available

4. Discussion

4.1. Prenatal CPCs and persistent obstructing cysts

Small CPCs identified during fetal screening and intraventricular cysts associated with hydrocephalus should be discussed as different clinical situations. The natural history of many incidental fetal CPCs is favorable, but this cannot be extrapolated to a cyst producing persistent ventricular outflow obstruction [1–3]. Similarly, the reported frequency of CPCs on prenatal ultrasound is not an estimate of the frequency of surgically treated obstructing lesions.

Prenatal counseling is guided by the full fetal phenotype and screening results. SMFM Consult Series #57 recommends no additional aneuploidy evaluation or imaging follow-up solely for an isolated fetal CPC after negative serum or cell-free DNA screening [3]. That recommendation does not apply unchanged when ventriculomegaly or another structural abnormality is present. In the two children described here, unilateral ventriculomegaly was the antenatal finding, and in Case 2

the cyst was also detected antenatally. The available records do not establish antenatal visualization of a CPC in Case 1, genetic testing or exclusion of every associated condition.

4.2. Anatomical origin and diagnostic features

Cysts associated with the choroid plexus have been described predominantly in the lateral ventricles, including the atrium or trigone, and less often in relation to the third ventricle [6]. Historical terminology is heterogeneous: reports using the terms neuroepithelial, choroid plexus or intraventricular “arachnoid” cyst do not necessarily describe identical histological entities [6,7]. A cyst near the foramen of Monro should therefore not be identified as a CPC solely because of its location.

Histogenesis remains debated. Developmental epithelial–mesenchymal relationships and the accumulation of fluid within a cystic cavity have been proposed, while some older accounts considered an arachnoid origin. Histological demonstration of a choroid-type epithelial lining and the operative relationship to the choroid plexus may help clarify the diagnosis [6–8]. Arachnoid and ependymal cysts remain relevant alternatives when the cyst origin is uncertain.

The two cases are reported as choroid plexus cysts associated with obstruction at the foramen of Monro. MRI and endoscopy documented intraventricular cystic obstruction, and at endoscopy the cyst was attached to the choroid plexus and had a thin wall in both patients. No cyst-wall specimen was obtained, so histological confirmation is not available and the designation rests on the MRI and operative appearance.

4.3. Mechanisms of obstruction and variable presentation

Cyst-related obstruction may be fixed or intermittent. Dynamic movement through the foramen of Monro has been documented endoscopically by Azab and colleagues and by ultrasonographic observation in the report of van Baalen and Stephani [9,10]. These observations support a possible mobility-related mechanism in selected patients, but mobility was not demonstrated in either of the present cases.

Cyst size alone does not establish clinical severity. Numaguchi and colleagues described large asymptomatic noncolloid neuroepithelial cysts; these observations inform the differential diagnosis but should not be counted automatically as histologically confirmed CPCs [11]. Hemorrhage within a choroid plexus cyst has also been reported [12], while a giant pediatric CPC has been associated with calvarial erosion [13]. Such heterogeneous presentations argue for assessing the cyst location, ventricular effects and clinical course rather than relying on a size threshold alone.

The first child presented with acute symptoms suggestive of intracranial hypertension, whereas the second had radiological hydrocephalus without overt clinical deterioration. This contrast is the main descriptive contribution of the series. It does not establish that the asymptomatic infant had progressive disease or that every persistent ventricular asymmetry warrants intervention. In Case 2, surgery was chosen to prevent decompensation with intracranial hypertension in an antenatally detected cyst with hydrocephalus on MRI; this is a clinical judgement, and no progression is inferred from the single MRI reported.

4.4. Imaging and figure–text correspondence

Thin intraventricular cyst walls may be difficult to distinguish from adjacent CSF on routine imaging. High-resolution sequences, including constructive interference in

steady state (3D-CISS) or fast imaging employing steady-state acquisition (FIESTA), can improve the depiction of thin membranes and the relationship of a cyst to the ventricular outlets [5,9]. These sequences are useful adjuncts rather than an obligatory diagnostic criterion. In Case 1, 3D FIESTA and FLAIR acquisitions were available (Figure 1); objective ventricular measurements are not available for either patient.

The imaging assessment should distinguish an obstructing cyst from a primary abnormality of the foramen of Monro or another intraventricular lesion. In these cases, unilateral ventricular dilatation with a reportedly normal contralateral lateral ventricle and third ventricle is consistent with a focal outlet obstruction, but does not by itself prove its histological cause. Accurate correspondence between the MRI, operative side and figure captions is essential to the interpretation of these observations.

4.5. Endoscopic treatment, septostomy and alternative approaches

The treatment objective for an obstructing intraventricular cyst is to improve CSF circulation while limiting morbidity. Endoscopic fenestration, excision or coagulation, open microsurgical procedures, aspiration and shunting have all been described in the literature [6–8]. The operative choice depends on the clinical presentation, ventricular anatomy, cyst attachment and whether a durable CSF pathway can reasonably be established. This case series cannot compare these alternatives.

Gangemi and colleagues reported endoscopic treatment of para- and intraventricular CSF cysts [14]. Outcomes from this broader cyst population should be distinguished from CPC-specific treatment evidence. CPC-specific reports describe endoscopic treatment of intermittent or acute obstruction, including the cases reported by Filardi and colleagues and Nahed and colleagues [15,16]. Endoscopic removal and cyst-wall coagulation have also been reported [8,17]. These publications support the use of endoscopy in selected anatomy, not a universal superiority claim.

Complete cyst-wall removal is not always required to achieve the functional aim of restoring ventricular outflow. Reports such as those by de Lara and colleagues and Eboli and Danielpour describe management tailored to third-ventricular anatomy [18,19]. Endoscopic third ventriculostomy is a separate procedure from septostomy; additional diversion depends on the level of obstruction and should not be treated as a routine component of every CPC operation [9,18,19].

Both children in this series underwent fenestration and septostomy. Fenestration was directed at the obstructing cyst, whereas septostomy was intended to create an alternative communication between the lateral ventricles. The rationale depends on the patency of the opposite ventricular outlet and the anticipated CSF pathways. Neither the additional benefit of septostomy nor durable restoration of CSF flow can be determined from operative still images alone.

Shunting remains an alternative when endoscopic management is unsuitable or does not provide adequate control of hydrocephalus [6]. Observation can also be considered for selected stable, asymptomatic lesions, but the benign course of an isolated prenatal CPC is not evidence that established obstructive hydrocephalus will resolve spontaneously [2,3,11]. Conversely, the absence of overt symptoms does not automatically establish that surgery is necessary; objective case-specific justification is required.

4.6. Outcomes, surveillance and limitations

Postoperative evaluation should document the clinical course and imaging findings rather than equate completion of fenestration with treatment success. In this series, the clinical course was uncomplicated to discharge, with no shunt placement or repeat endoscopy and resolution of the signs of intracranial hypertension in Case 1. Ventricular size, patency of the CSF pathways and cyst recurrence could not be assessed because no postoperative imaging was obtained, and the follow-up duration is not available. In the infant, follow-up growth and developmental observations would also be important but are not available.

The principal limitations are the two-patient sample, retrospective design, absence of histological findings because no specimen was obtained, absence of postoperative imaging, lack of a documented date of last assessment and follow-up duration, unavailable examination dates and limited objective documentation of the indication for surgery in the clinically asymptomatic infant. The narrative literature review is also subject to selection and publication bias. These limitations prevent estimation of recurrence, morbidity or durable shunt independence, mean that cyst recurrence and persistent foraminal obstruction cannot be radiologically excluded, and preclude comparative conclusions about treatment effectiveness.

5. Conclusion

Unilateral hydrocephalus associated with a cyst at the foramen of Monro may present with acute intracranial hypertension or without overt symptoms in early infancy. The two reported patients underwent endoscopic fenestration and septostomy without complications, shunt placement or repeat endoscopy in the available record, illustrating an anatomy-directed approach to CPC-related obstruction. Because no postoperative imaging or documented follow-up is available, recurrence and durable relief of obstruction cannot be assessed, and the conclusions remain descriptive rather than claiming proven long-term efficacy or avoidance of shunt dependency.

6. Declarations

Consent for publication: Written informed consent for publication of clinical information and images was obtained from the parents of both children.

Ethics: This report describes two patients treated as part of routine clinical care; it did not undergo review by an institutional ethics committee.

Competing interests: The authors declare that they have no competing interests.

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Author contributions: H.O.: conceptualization, clinical data collection, imaging analysis, writing – original draft. N.H.: surgical management, imaging analysis, supervision. L.A.: literature review, writing – review and editing. All authors read and approved the final manuscript.

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