Clinical Case Reports

ISSN: 2675-3626

Delayed Chronic Subdural Hematoma Associated with a Temporal Arachnoid Cyst in a Child: Case Report

Hoai TP Dinh[1], PhongSon Dinh[2], Hoang D. Tran[1], Minh T. Nguyen[1]

[1] Department of Neurosurgery, Hue University of Medicine and Pharmacy Hospital, Vietnam

[2] Center for Molecular Biology, Duy Tan University, Da Nang, Vietnam

✉ Hoai TP Dinh, MD, PhD

email: phuonghoai1412.md@gmail.com

Available at:
http://www.archpedneurosurg.com.br/

Introduction: Chronic subdural hematoma (cSDH) is uncommon in children and is particularly rare when associated with congenital arachnoid cysts. This combination presents diagnostic and therapeutic challenges, especially when initial trauma and early imaging findings are unremarkable.

Case Presentation: An 11-year-old previously healthy boy presented with progressive headache and recurrent vomiting three months after a minor head injury. Initial brain computed tomography (CT) performed immediately after the trauma was normal. On admission, repeat CT demonstrated a left-sided chronic subdural hematoma measuring 17 mm in thickness with a 12 mm midline shift, along with a left temporal arachnoid cyst (38 × 22 × 44 mm). Burr-hole evacuation of the hematoma was performed under general anesthesia without intervention on the cyst. The postoperative course was uneventful, with complete resolution of symptoms. Follow-up CT confirmed full hematoma evacuation and normalization of intracranial structures.

Conclusions: Delayed chronic subdural hematoma can develop after minor head trauma in children with temporal arachnoid cysts, even when initial imaging is normal. Burr-hole evacuation alone may achieve favorable outcomes, and cyst fenestration is not always required. Early recognition and appropriate follow-up are essential for optimal management.

Keywords: Arachnoid Cysts, Burr Holes, Child, Chronic subdural hematoma, Head Injuries

INTRODUCTION

Arachnoid cysts (ACs) are common congenital intracranial lesions containing cerebrospinal fluid (CSF), frequently identified incidentally in children [1]. Although most ACs remain asymptomatic, they are recognized as an important predisposing factor for the development of chronic subdural hematoma (cSDH) in young patients [2]. While cSDH typically occurs in the elderly, its occurrence in children and adolescents is strongly associated with the presence of arachnoid cysts—especially those located in the temporal region [2, 3].

Previous reports have shown that approximately 4.6% of arachnoid cysts may develop subdural hematoma or intracystic hemorrhage, increasing to 6.5% in temporal cysts [3]. The underlying mechanism may involve fragile vascular structures between the cyst membrane and dura, which are prone to tearing after minor trauma. Even trivial head injuries may cause fluid leakage or bleeding, leading initially to a subdural hygroma that gradually evolves into a chronic subdural hematoma [2]. A major clinical challenge is that the hematoma often appears weeks or months after trauma, resulting in delayed diagnosis [1]. In children, symptoms differ from those in older adults, with signs of increased intracranial pressure—such as headache and vomiting—being predominant [2].

This report describes a case of delayed cSDH following minor head trauma in a child with a temporal arachnoid cyst and discusses its clinical relevance in the context of previously reported cases.

CASE REPORT

Submitted: 07 February 2026
Accepted: 03 May 2026
Published: 15 May 2026

An 11-year-old previously healthy boy was admitted with a 3-day history of progressive headache and recurrent vomiting. No motor weakness or altered consciousness was noted.

History: Three months earlier, he had sustained a minor head injury after falling and striking the left temporal region, with a brief loss of consciousness (5–10 minutes) and mild local swelling (3 × 3 cm). Brain CT scans at a local hospital and Hue University of Medicine and Pharmacy Hospital were normal (Figure 1).

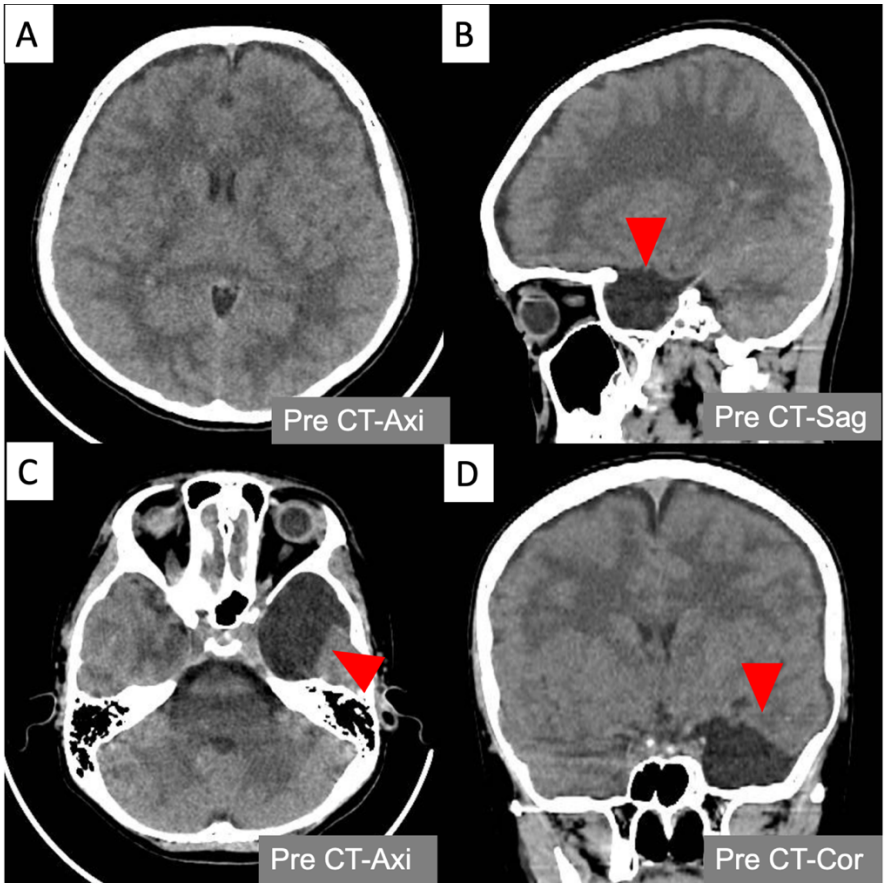

Figure 1. Initial brain CT images obtained immediately after the head injury. (A–D) Axial, sagittal, and coronal views demonstrating a left temporal arachnoid cyst (red arrowhead), without evidence of intracranial hemorrhage

The patient recovered completely within 24 hours and resumed normal activities (Table 1).

Table 1. Timeline of Clinical Course

Time	Event
Day 0	Minor head injury; initial CT normal
Day 1	Full recovery
Weeks 1–11	Asymptomatic
Week 12	Headache, vomiting
Admission	cSDH + arachnoid cyst detected
Surgery	Burr-hole evacuation
48 hours	Symptom resolution
1 week	CT normal

DOI: 10.46900/apn.v8i2.356

3 months	No recurrence

Examination*:** On admission, the patient was alert (GCS 15). Neurological examination was normal with no focal deficits. Pupils were equal and reactive. ***Imaging: Non-contrast CT revealed a left chronic subdural hematoma measuring approximately 17 mm in thickness with a 12 mm midline shift to the right, compressing the left lateral ventricle. A left middle cranial fossa cyst, well-defined and CSF-equivalent in density (38 × 22 × 44 mm), consistent with a temporal arachnoid cyst, was also seen. No intracystic hemorrhage was detected. (Figure 2)

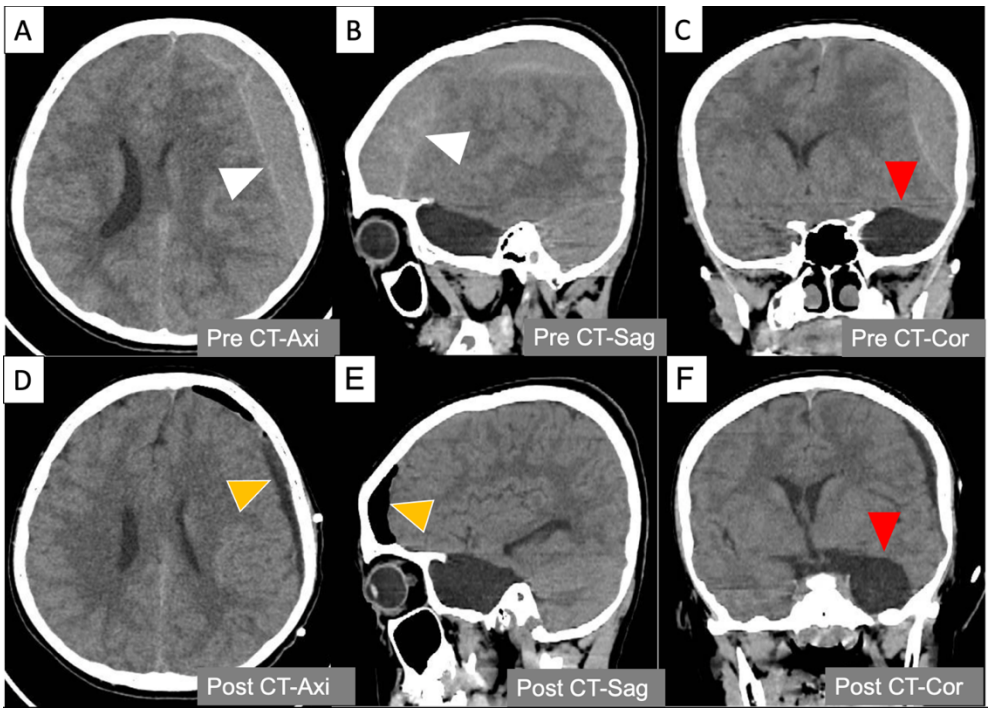

Figure 2. Preoperative and postoperative brain CT images. (A–C) Axial, sagittal, and coronal non-contrast CT images obtained three months after the initial injury demonstrating a left-sided chronic subdural hematoma (white arrowhead) with significant mass effect, along with a left temporal arachnoid cyst (red arrowhead). (D–F) Postoperative CT images showing complete resolution of the hematoma and restoration of normal midline structures

The diagnosis was left chronic subdural hematoma associated with a left temporal arachnoid cyst following minor head trauma. Burr-hole evacuation was performed under general anesthesia. Xanthochromic fluid was aspirated, with no evidence of active bleeding (Figure 3).

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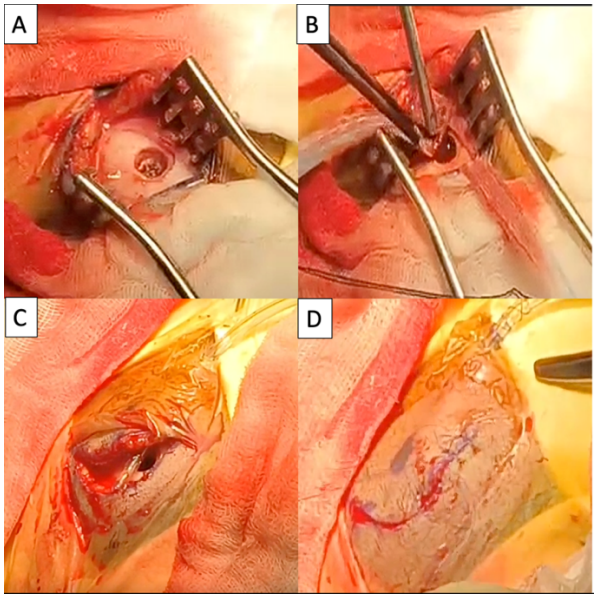

Figure 3. Intraoperative images showing burr-hole evacuation of the chronic subdural hematoma, with drainage of xanthochromic fluid

The cyst was not opened as no communication with the hematoma cavity was observed. The postoperative course was uneventful. Headache and vomiting resolved within 48 hours.

Follow-up CT at 1 week showed complete evacuation of the hematoma and normalization of midline structures. At 3 months, the patient remained asymptomatic with normal neurological findings.

DISCUSSION

Epidemiology and Clinical Significance

Arachnoid cysts are common congenital lesions, but their association with cSDH represents a distinct clinical entity in young individuals [1, 2] and is rare [4]. While cSDH typically affects elderly patients (mean age ~69.5 years), cases related to arachnoid cysts occur at a much younger mean age (~27.8 years), including children under 15 years [2]. Male predominance is reported (~74.5%) [5]. The cyst's location is critical—most cases occur in the middle cranial fossa (temporal region) [2]. Approximately 4.6–6.5% of patients with temporal arachnoid cysts experience subdural hemorrhage [3]. This suggests that even small arachnoid cysts may represent a significant risk factor for the development of cSDH following minor head trauma [2]. The present case highlights several clinically important aspects. First, it demonstrates that chronic subdural hematoma can develop in a delayed manner following minor head trauma, even when the initial CT scan is normal. Second, it emphasizes the occurrence of this condition in a pediatric patient, a population in which cSDH is relatively uncommon. Third, the favorable outcome achieved with burr-hole evacuation alone, without cyst fenestration, supports a less invasive management strategy in selected cases. Finally, this case underscores the importance of clinical vigilance and appropriate follow-up in children with arachnoid cysts after minor head injury, even in the absence of early radiological abnormalities.

Pathophysiology

Several mechanisms have been proposed: ***Structural fragility:*** The arachnoid cyst membrane is loosely adherent to the dura in the middle fossa, containing fragile bridging veins susceptible to rupture with minor impact [3]. ***CSF leakage and hygroma formation:*** Minor trauma may rupture the cyst wall, causing CSF leakage into the subdural space and forming a hygroma that subsequently evolves into cSDH [2]. ***Morphological risk:*** Larger cysts (≥5–7 cm) or type III cysts on imaging carry higher hemorrhage risk [5, 6]. Cesarean birth history has also been proposed as an independent risk factor [5]. To contextualize the present case, we summarized selected previously reported pediatric cases of chronic subdural hematoma

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associated with arachnoid cysts. Available evidence suggests that this condition predominantly affects male patients and is most commonly associated with arachnoid cysts located in the middle cranial fossa.

Delayed Presentation and Diagnosis

Bleeding typically occurs weeks to months after trauma, contributing to diagnostic delay [1]. Symptoms in children mainly reflect raised intracranial pressure—progressive headache and vomiting—rather than motor deficits or gait disturbance typical in elderly patients [1, 2]. In contrast, typical symptoms in the elderly, such as gait disorders or hemiplegia, are less common in this group of patients. In the present case, the main symptoms were headache and vomiting. In most reported cases, the condition is preceded by minor head trauma, with a delay of several weeks to months before symptom onset. Imaging typically demonstrates a subdural hematoma ipsilateral to the arachnoid cyst, often accompanied by mass effect and midline shift. Surgical management most commonly involves burr-hole evacuation, with or without cyst fenestration, and clinical outcomes are generally favorable. Diagnosis relies on CT or MRI showing coexistence of a subdural hematoma and temporal cyst (Table 2) [2, 5, 6].

Table 2. Selected previously reported pediatric cases of arachnoid cyst–associated chronic subdural hematoma

Author	Year	Age	Sex	Cyst location	Trauma	Delay	Treatment	Outcome
Mori et al.	2002	12	M	Temporal	Minor	Weeks	Burr-hole	Good
Liu et al.	2014	10	M	Temporal	Minor	Months	Burr-hole	Good
Xu et al.	2023	13	M	Temporal	Minor	Weeks	Burr-hole + fenestration	Good
Present case	2026	11	M	Temporal (left)	Minor	3 months	Burr-hole	Favorable

Treatment

Chen et al. [7] reviewed 474 patients with middle fossa arachnoid cysts, finding endoscopic fenestration to be the safest approach, although outcomes were comparable among different techniques. For cSDH, burr-hole evacuation remains the standard treatment [8]. In cases of cSDH associated with arachnoid cysts, opinions differ. Most authors recommend burr-hole evacuation alone for rapid symptom relief in selected cases [2]. This approach may effectively facilitate hematoma evacuation, clear inflammatory mediators, and interrupt the cycle of microbleeding and exudation typical of chronic subdural hematoma [9]. Some advocate cyst fenestration or excision to prevent recurrence [1]. While others have reported successful conservative management in selected cases [6].

Follow-up

Children with known arachnoid cysts should be closely monitored, particularly following minor head trauma, given the potential risk of delayed subdural bleeding [1, 6].

CONCLUSION

Chronic subdural hematoma in children, though rare, can develop weeks or months after minor trauma—especially in the presence of a temporal arachnoid cyst. However, given the limited evidence from single-case reports, treatment strategies should be interpreted with caution. Favorable outcomes may be achieved with burr-hole evacuation alone in selected cases, without the need for cyst fenestration; however, management should be individualized based on clinical and radiological factors. Recognition of the potential for delayed presentation, along with an understanding of the underlying mechanisms and appropriate follow-up strategies, is essential to ensure early diagnosis and optimize patient outcomes.

DISCLOSURES

Ethical approval

Ethical approval was waived / not required for this anonymized case report in accordance with institutional policy.

Consent for publication

Written informed consent was obtained from the patient's legal guardian for the publication of this case report, including clinical details and accompanying images.

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.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors

Artificial intelligence

The authors affirm that no artificial intelligence tools were used in the writing, editing, or content generation of this manuscript. All work was conducted manually, based on thorough research and academic expertise.

CONTRIBUTIONS

Hoai T.P. Dinh Conceptualization; Investigation; Data curation; Writing – original draft; Writing – review & editing; Visualization.
PhongSon Dinh: Supervision; Methodology; Validation; Writing – review & editing.
Hoang D. Tran: Formal analysis; Literature review; Writing – review & editing.
Minh T. Nguyen: Resources; Data curation; Writing – review & editing.

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