Thai Journal of Neurological Surgery
Vol. 17 No. 1 January - March 2026

Thai J Neurological Surg 2026: 17(1): 22 - 29

รายงานผู้ป่วย/Case Report

Infantile High-Grade Glioma: A Case Report from Southern Thailand

Rachakorn Punyasiri[1], M.D., Avika Trakulpanitkit[1], M.D., Thara Tunthanathip[1,2], M.D.,Ph.D.

[1]Division of Neurosurgery, Department of Surgery, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand.

[2]Brain tumor center, Department of Surgery, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand.

Abstract

Background: High-grade gliomas (HGG) in infants under 1 year of age are rare, biologically distinct tumors that often present with subtle, nonspecific symptoms. Early diagnosis remains challenging in resource-limited settings.

Case: We present the case of an 11-month-old Thai girl with one month of progressive early-morning vomiting, irritability, head-grabbing behavior, and recurrent falls. She developed an acute generalized tonic-clonic seizure before hospital arrival. Magnetic resonance imaging revealed a large supratentorial mass with mass effect. Gross total resection was performed. Histopathology demonstrated high-grade glioma with anaplastic features, brisk mitoses, microvascular proliferation, and a Ki-67 index of 35%. Immunohistochemistry showed GFAP positivity, positive H3K27me3, and negative IDH1-R132H. Molecular fusion testing was not available. Postoperative recovery was uneventful, and adjuvant chemotherapy following the Thai POG-BT-131FB protocol was planned.

Discussion: We present the case of an 11-month-old Thai girl with one month of progressive early-morning vomiting, irritability, head-grabbing behavior, and recurrent falls. She developed an acute generalized tonic-clonic seizure before hospital arrival. Magnetic resonance imaging revealed a large supratentorial mass with mass effect. Gross total resection was performed. Histopathology demonstrated high-grade glioma with anaplastic features, brisk mitoses, microvascular proliferation, and a Ki-67 index of 35%. Immunohistochemistry showed GFAP positivity, positive H3K27me3, and negative IDH1-R132H. Molecular fusion testing was not available. Postoperative recovery was uneventful, and adjuvant chemotherapy following the Thai POG-BT-131FB protocol was planned.

Received: December 19, 2025 | Revised: January 2, 2026 | Accepted: January 3, 2026

*Corresponding Author: **Thara Tunthanathip**

Email: tsus4@hotmail.com, thara7640@gmail.com

Conclusion: This case highlights key diagnostic clues for infantile HGG and emphasizes the need for early neuroimaging in infants presenting with persistent vomiting and acute neurological changes. Multimodal treatment -including maximal safe resection and chemotherapy -is essential in this age group.

Keywords: Infantile high-grade glioma; neuro-oncology; seizure; glioma; infant-type hemispheric gliomas

Introduction

Pediatric high-grade gliomas (HGGs) represent one of the most aggressive and challenging primary brain tumors in childhood, accounting for approximately 8–12% of pediatric central nervous system (CNS) neoplasms.[1,2] Recent revisions in the World Health Organization (WHO) classification of central nervous system tumors have further refined infant high-grade gliomas into biologically defined entities, underscoring the importance of integrated histopathological and molecular evaluation. Markers such as H3K27 alteration, IDH mutation status, ATRX expression, and proliferative indices now play a central role in diagnosis, prognostication, and therapeutic decision-making.[3] Moreover, the infant-type hemispheric gliomas (IHG) are enormously rare, highly vascular, large-scale tumors of the cerebral hemispheres commonly diagnosed during infancy. The incidence of IHG was limited from the review of the literature. Chavaz et al. reviewed 164 infants with IHG and reported that the median age of 3.4 months, a 3-year event-free survival of 49.5% (95% CI (Confidence Interval), 40.7–60.2), and an overall survival of 79.6% (95% CI 72.1–87.9). Intracranial hemorrhage was found in 23% of cases.[4] In molecular findings, IHGs frequently contain receptor tyrosine-kinase (RTK) gene fusions, denoting a potential vulnerability to targeted therapy by small-molecule RTK inhibitors[5,6]

In infants younger than one year, the management of HGG poses additional complexity.[7] Early clinical manifestations are often nonspecific, including vomiting, irritability, and developmental regression, which may delay diagnosis. Moreover, therapeutic strategies must balance oncologic control against the profound neurodevelopmental toxicity associated with cranial irradiation at a very young age. Consequently, treatment protocols for this age group frequently emphasize maximal safe resection followed by chemotherapy-based regimens designed to defer or avoid radiotherapy.[8] Reports of infantile supratentorial HGG remain limited, particularly from low- and middle-income countries, where access to molecular diagnostics and age-adapted treatment protocols may vary. Case-based evidence from diverse geographic and healthcare settings is therefore essential to broaden clinical understanding and inform context-specific management strategies.[9]

In this report, we describe the clinical presentation, radiologic findings, surgical management, histopathological features, and early outcome of an 11-month-old child diagnosed with supratentorial infantile HGG in southern Thailand, highlighting diagnostic challenges and age-appropriate therapeutic considerations.

Case Presentation

An 11-month-old girl with previously normal growth and development was referred to a tertiary

Thai Journal of Neurological Surgery
Vol. 17 No. 1 January - March 2026

neurosurgical center with a one-month history of progressive early-morning vomiting, increasing irritability, and recurrent falls. According to her mother, the child frequently grasped her head with both hands, suggesting discomfort, although no definite lateralizing neurological signs were observed. Vomiting occurred almost daily, predominantly in the morning, and was accompanied by progressive lethargy. Approximately 30 minutes prior to arrival at a local hospital, the patient became unusually fatigued and subsequently developed a generalized tonic–clonic seizure lasting about three minutes, followed by a second convulsive episode of approximately ten minutes during transport by emergency medical services. Upon arrival at the tertiary center, the patient was alert but irritable.

The patient was born at term (40 weeks' gestation) with a birth head circumference of 33 cm (10th percentile. Developmental milestones had been age-appropriate. Immunizations were incomplete, with the last vaccination administered at four months of age. There was no family history of epilepsy, malignancy, or inherited neurological disorders.

On examination, vital signs were stable. Neurological assessment revealed a Glasgow Coma Scale score of E4V5M6. Pupils were equal and reactive to light, measuring 3 mm bilaterally. The anterior fontanelle measured approximately 1.5 × 1.5 cm and was soft and non-bulging. Muscle tone and motor responses were appropriate for age, and no focal neurological deficits, cranial nerve abnormalities, or cerebellar signs were identified.

Magnetic resonance imaging (MRI) of the brain revealed a large, multiloculated intra-axial mass located in the left temporo-occipital region. On contrast-enhanced T1-weighted images in both axial (**Figure 1A**) and coronal (**Figure 1B**) planes, the lesion demonstrated heterogeneous peripheral and septal enhancement surrounding multiple non-enhancing cystic components with a size of 6 x 8 x 5 cm. An irregularly enhancing solid component was observed along the medial aspect of the lesion. On T2-weighted imaging (**Figure 1C**), the mass showed marked hyperintensity of the cystic components with a heterogeneous internal signal, accompanied by extensive surrounding vasogenic edema and significant mass effect, including effacement of adjacent cortical sulci and compression of the ipsilateral lateral ventricle with contralateral midline shift. The T2-weighted fast field echo (FFE) sequence (**Figure 1D**) demonstrated prominent susceptibility-induced signal loss within the solid component of the lesion, consistent with intratumoral hemorrhage or blood degradation products. No definite evidence of calcification could be confirmed on the available sequences. In addition, spinal MRI with T1-weighted images (Figure 1E), including the cervical, thoracic, lumbar, and sacral regions, revealed no evidence of leptomeningeal enhancement, intradural or intramedullary metastatic lesions, or spinal cord compression, suggesting no radiologic evidence of spinal dissemination at the time of imaging.

Initial management included intravenous dexamethasone for intracranial pressure control and antiepileptic therapy. The patient subsequently underwent a supratentorial craniotomy with the goal of maximal safe tumor resection. A transcortical approach via the temporal cortex was utilized. Numerous small feeding vessels were identified surrounding the tumor, with hemosiderin deposition in the peritumoral region and evidence of intramural hemorrhage. En bloc resection was performed, achieving gross total tumor removal.

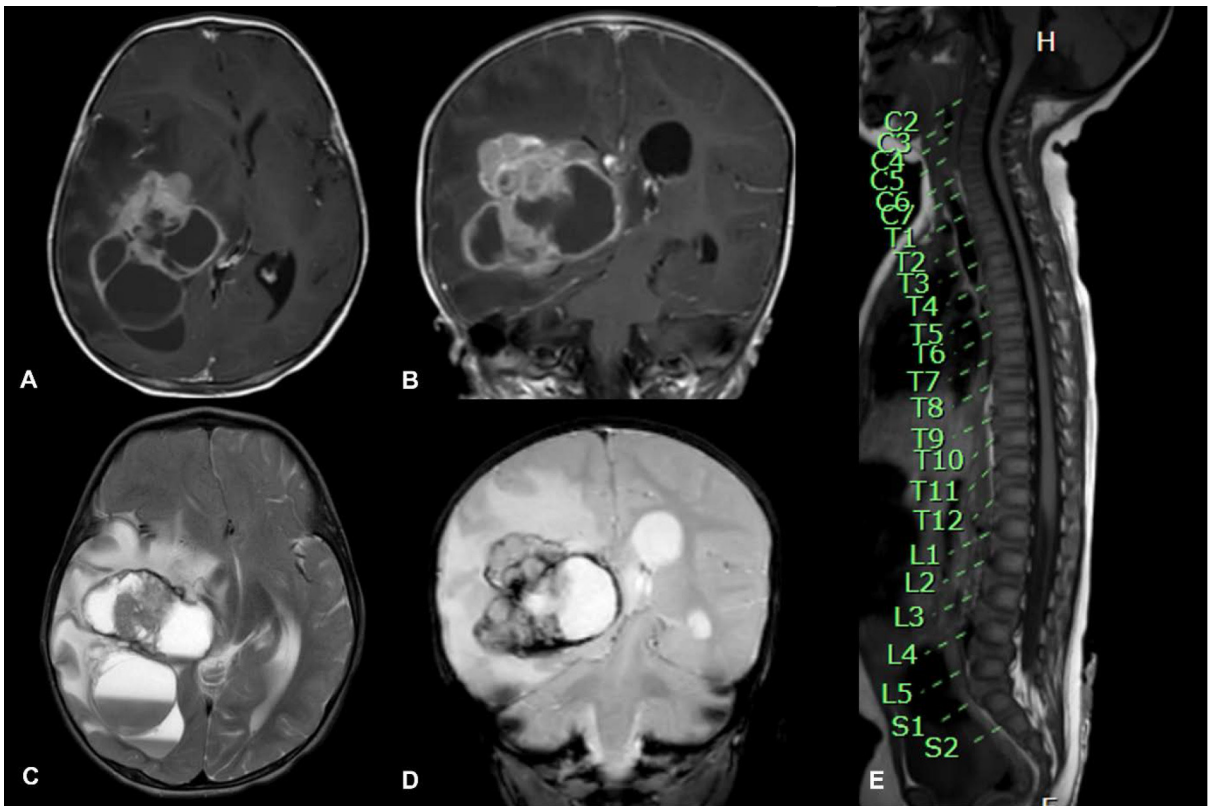

Figure legends

Figure 1. Magnetic resonance imaging of the brain and spine demonstrating a large multiloculated cystic mass in the left temporo-occipital region.

(A) Axial contrast-enhanced T1-weighted image shows heterogeneous peripheral and septal enhancement with a solid enhancing component.

(B) Coronal contrast-enhanced T1-weighted image further delineates the multiloculated cystic architecture and enhancing solid portion.

(C) Axial T2-weighted image reveals markedly hyperintense cystic components with surrounding vasogenic edema and significant mass effect.

(D) Coronal T2-weighted fast field echo image demonstrates susceptibility-related signal loss within the lesion, compatible with intratumoral hemorrhage.

(E) Sagittal spinal MRI demonstrates no evidence of spinal cord compression or leptomeningeal dissemination.

No episodes of hypotension were observed, and the estimated intraoperative blood loss was 50 ml.

Gross examination of the resected specimen revealed a soft, gray-tan mass with focal areas of necrosis (**Figure 2A**). Postoperative computed tomography of the brain demonstrated pneumocephalus beneath the craniotomy flap and minimal residual blood products along the surgical cavity (**Figure 2B**).

Histopathological findings, as shown in Figure 3A-F, reveal dense hypercellularity, marked nuclear pleomorphism, frequent mitotic figures, microvascular proliferation, and focal necrosis. Immunohistochemical staining showed positivity for glial fibrillary acidic protein (GFAP) and focal positivity for synaptophysin. The Ki-67 proliferation index was approximately 35%. Immunohistochemical findings-specifically retained ATRX expression,

Thai Journal of Neurological Surgery
Vol. 17 No. 1 January - March 2026

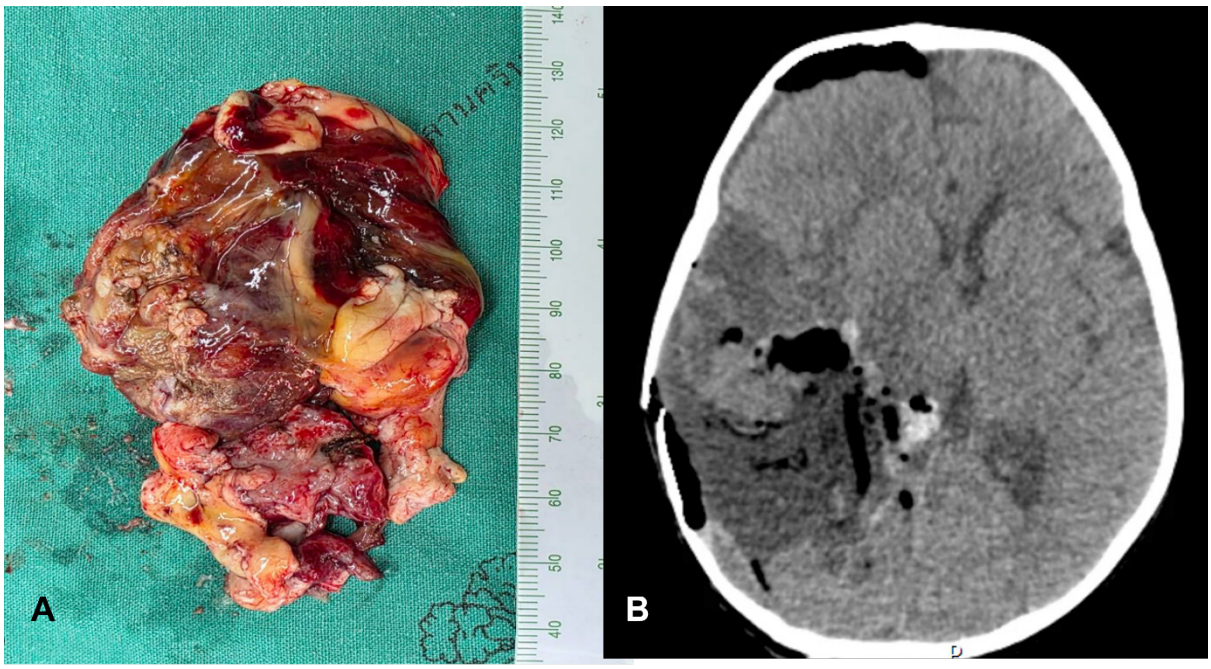

Figure 2. Gross pathological findings and postoperative image. (A) Gross pathological specimen showing an irregular, friable, tan-colored tumor measuring 8.0 × 5.0 × 2.5 cm. (B) Axial computed tomography image of the brain showing pneumocephalus beneath the craniotomy flap and minimal residual blood products along the surgical cavity.

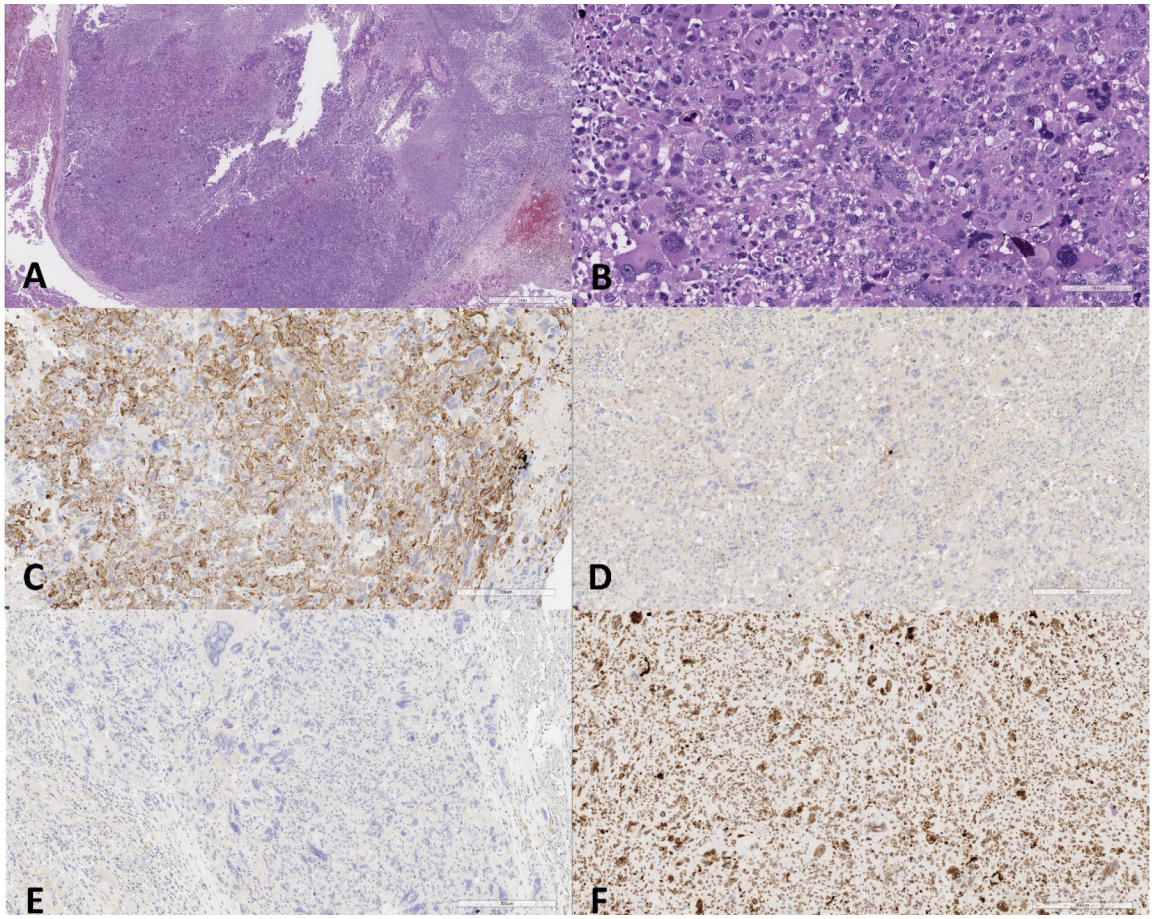

Figure 3. Histopathological and immunohistochemical findings of the tumor. (A) H&E, ×20. (B) H&E, ×100. (C) GFAP positive. (D) IDH1 (R132H) negative. (E) H3K27M negative. (F) retain H3K27me3 expression.

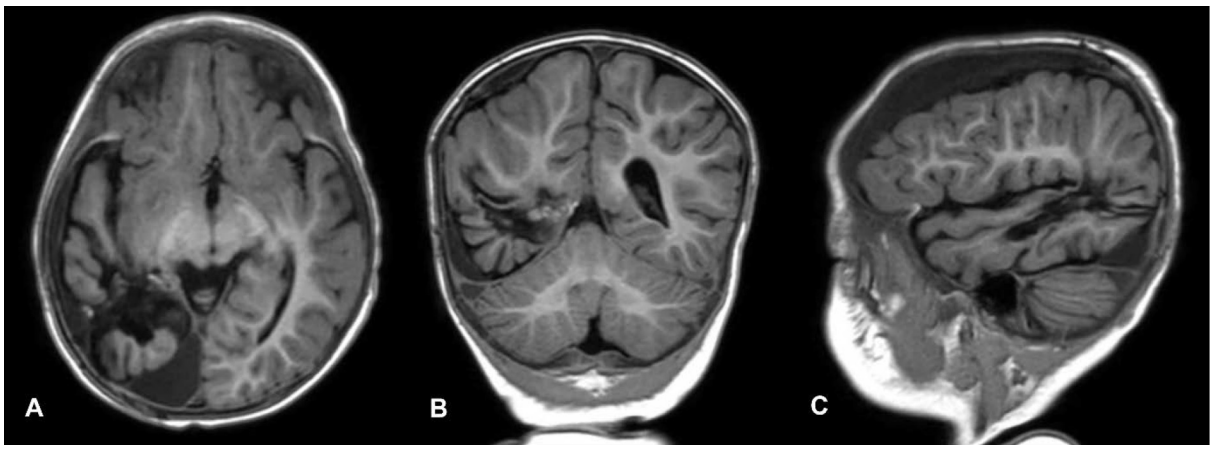

Figure 4. Follow-up T1-weighted magnetic resonance imaging of the brain demonstrating no evidence of tumor recurrence. (A) Axial T1-weighted image, (B) Coronal T1-weighted image, (C) Sagittal T1-weighted image.

preserved H3K27me3 staining, and absence of IDH1-R132H mutation-supported the diagnosis of infantile HGG rather than adult-type glioblastoma or diffuse midline glioma.

The patient recovered without new neurological deficits, tolerated oral intake, and remained seizure-free. Given her age and the substantial neurodevelopmental risks associated with radiotherapy in children younger than three years, radiation therapy was deferred. She was scheduled to receive adjuvant chemotherapy according to the Thai Pediatric Oncology protocol (POG-BT-131FB), which incorporates vincristine and cyclophosphamide to delay or avoid radiotherapy. At the most recent follow-up (1-year follow-up), the patient demonstrated age-appropriate activity, stable neurological status, and no recurrence of seizures. Follow-up gadolinium-enhanced T1-weighted MRI of the brain was limited by patient noncooperation, which restricted image quality; nevertheless, no definite evidence of tumor recurrence was identified, as shown in **Figure 4A-C.** Therefore, long-term clinical and radiological surveillance is ongoing.

Clinical Discussion

Infantile HGGs represent a rare and biologically distinct subgroup of pediatric CNS tumors, differing substantially from HGG diagnosed in older children and adults. IHGs are rare high-grade astrocytic tumors characterized by giant size and abundant vascularity, often with regions of cystic transformation. From the literature review, IHGs have a poor prognosis. Papusha et al. reported that 15 patients with IHG had a 2-year overall survival rate of 61% (CI 39%-95%)10, while Bagchi reviewed IHG and infantile HGG cases and reported a 2-year overall survival rate ranging from 42%-48%.[5] In addition, Chavaz et al. reported that IHG had a 3-year event-free survival of 49.5% (95% CI, 40.7–60.2), and an overall survival of 79.6% (95% CI 72.1–87.9).[4]

Maximal safe surgical resection remains the cornerstone of treatment for infantile HGG and is consistently recognized as one of the strongest predictors of survival.[11,12] In the present case, total resection was achieved without postoperative neurological deficits, underscoring the critical role of meticulous surgical planning and technical expertise. In addition, appropriate postoperative adjuvant therapy plays an essential role in reducing

the risk of tumor recurrence. Given the substantial neurodevelopmental risks associated with radiotherapy in children younger than three years13, chemotherapy-based regimens are generally favored as first-line adjuvant treatment in this age group.[11,14]

Because infantile hemispheric gliomas (IHGs) are frequently driven by gene fusions involving *NTRK1*, *NTRK2, NTRK3, ROS1, ALK, or MET,* establishing a definitive diagnosis can be particularly challenging in resource-limited settings where advanced molecular testing is not readily available.10 Although IHG was strongly suspected in the present case based on clinical and radiological features, our institution could not perform comprehensive gene fusion analyses. Consequently, the diagnosis was supported by histopathological characteristics and immunohistochemical findings consistent with infantile high-grade glioma. However, the absence of molecular confirmation represents an inherent limitation of this case.

Commentary within Scope

While molecular profiling increasingly informs prognostication and enables targeted therapies in pediatric neuro-oncology, clinical decision-making is often constrained by limited access to advanced molecular diagnostics, especially in low- and middle-income countries.10,15 In such contexts, prioritizing a focused panel of high-yield, clinically actionable biomarkers that can be reliably assessed using available resources may help bridge this diagnostic gap. Nevertheless, consensus regarding the optimal biomarker set for resource-limited settings remains lacking, highlighting the need for further multicenter studies and global collaborative efforts.[16,17]

Conclusions

Infantile HGGs are rare tumors with distinct biological behavior and often subtle clinical manifestations. Persistent vomiting, irritability, or changes in motor behavior in infants should prompt early neuroimaging to avoid diagnostic delay. Multimodal management, emphasizing maximal safe resection and chemotherapy-based strategies, remains essential. This case contributes to the limited body of literature on infantile HGG from Southeast Asia and highlights the ongoing need to strengthen pediatric neuro-oncology infrastructure in resource-constrained settings

References

1. Ostrom QT, de Blank PM, Kruchko C, et al. Alex's Lemonade Stand Foundation infant and childhood primary brain and central nervous system tumors diagnosed in the United States in 2007–2011. Neuro Oncol. 2014;16(Suppl 10):x1–36. doi:10.1093/neuonc/nou327.
2. Fangusaro J. Pediatric high grade glioma: a review and update on tumor clinical characteristics and biology. Front Oncol. 2012;2:105. doi:10.3389/fonc.2012.00105.
3. Louis DN, Perry A, Wesseling P, Brat DJ, Cree IA, Figarella-Branger D, et al. The 2021 WHO classification of tumors of the central nervous system: a summary. Neuro Oncol. 2021;23(8):1231–51. doi:10.1093/neuonc/noab106.
4. Chavaz L, Bagchi A, Dhanda SK, et al. A systematic study of molecular diagnosis, treatment and prognosis in infant-type hemispheric glioma: an individual patient data meta-analysis of 164 patients. Neuro Oncol. 2025 Nov 8;noaf264.

Epub ahead of print. doi:10.1093/neuonc/noaf 264. PMID:41206756.

5. Bagchi A, Chiang J, Pinto S, Dhanda S, Gajjar A. Infant-type hemispheric gliomas: a review of clinical, radiologic, histopathologic, and molecular features. J Natl Compr Canc Netw. 2025;23(11):e257064.doi:10.6004/jnccn.2025.7064.
6. Guerreiro Stucklin AS, Ryall S, Fukuoka K, Zapotocky M, Lassaletta A, Li C, Bridge T, Kim B, et al. Alterations in ALK/ROS1/NTRK/MET drive a group of infantile hemispheric gliomas. Nat Commun. 2019;10(1):4343. doi:10.1038/s41467-019-12187-5.
7. Buccoliero AM, Giunti L, Moscardi S, Castiglione F, Provenzano A, Sardi I, et al. Pediatric high-grade glioma classification criteria and molecular features of a case series. Genes (Basel). 2022;13(4):624. doi:10.3390/genes13040624.
8. Jones C, Karajannis MA, Jones DTW, Kieran MW, Monje M, Baker SJ, et al. Pediatric high-grade glioma: biologically and clinically in need of new thinking. Neuro Oncol. 2017;19(2):153–61. doi:10.1093/neuonc/now101.
9. Baugh JN, Gielen GH, van Vuurden DG, Veldhuijzen van Zanten SEM, Hargrave D, Massimino M, et al. Transitioning to molecular diagnostics in pediatric high-grade glioma: experiences with the 2016 WHO classification of CNS tumors. Neurooncol Adv. 2021;3(1):vdab113. doi:10.1093/noajnl/vdab113.
10. Papusha L, Zaytseva M, Senchenko M, Panferova A, Sanakoeva A, Artemov A, et al. Challenges in diagnostics and treatment of infant-type hemispheric gliomas. Neurooncol Adv. 2025;7(1):vdaf124. doi:10.1093/noajnl/vdaf124.
11. Lu VM, O'Connor KP, Himes BT, Brown DA, Nesvick CL, Siada RG, et al. Effect of surgery and chemotherapy on long-term survival in infants with congenital glioblastoma: an integrated survival analysis. J Neurosurg Pediatr. 2020;26(5):563–71.doi:10.3171/2020.5.EDS20226.
12. Tunthanathip T, Madteng S. Factors associated with the extent of resection of glioblastoma. Precis Cancer Med. 2020;3:12.doi:10.21037/pcm.2020.01.01.
13. Major N, Patel NA, Bennett J, Novakovic E, Poloni D, Abraham M, et al. The current state of radiotherapy for pediatric brain tumors: an overview of post-radiotherapy neurocognitive decline and outcomes. J Pers Med. 2022;12(7):1050. doi:10.3390/jpm12071050.
14. Chiang J, Bagchi A, Li X, Dhanda SK, Huang J, Pinto SN, et al. High-grade glioma in infants and young children is histologically, molecularly, and clinically diverse: results from the SJYC07 trial and institutional experience. Neuro Oncol. 2024;26(1):178–90.doi:10.1093/neuonc/noad130.
15. Tunthanathip T, Sae-Heng S, Oearsakul T, Kaewborisutsakul A, Taweesomboonyat C. Economic impact of a machine learning-based strategy for preparation of blood products in brain tumor surgery. PLoS One. 2022;17(7):e0270916. doi:10.1371/journal.pone.0270916.
16. Clarke M, Mackay A, Ismer B, Pickles JC, Tatevossian RG, Newman S, et al. Infant high-grade gliomas comprise multiple subgroups characterized by novel targetable gene fusions and favorable outcomes. Cancer Discov. 2020;10(7):942–63. doi:10.1158/2159-8290.CD-19-1030.
17. Jitchanvichai J, Tunthanathip T. Cost-effectiveness of intracranial pressure monitoring in severe traumatic brain injury in Southern Thailand. Acute Crit Care. 2025;40(1):69–78. doi:10.4266/acc.004080.