Case Lessons 33-2025

Awake Craniotomy for a Temporal Lobe Glioma in a Pediatric Patient

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Abstract

Awake craniotomy (AC) in pediatric patients is a developing neurosurgical technique for resecting tumors near eloquent cortex. This report details the case of a 14-year-old boy who underwent AC for resection of a left temporal lobe low-grade glioma located in the language-dominant hemisphere. Key elements included extensive preoperative neurocognitive assessment, intraoperative language mapping with cortical stimulation, and continuous neurophysiological monitoring. Near-total resection (NTR) was achieved while preserving speech function. This case demonstrates the feasibility and efficacy of AC in pediatric patients with appropriate preparation.

Introduction

Resection of gliomas involving language regions requires precise surgical planning to preserve function.[1] Awake craniotomy with intraoperative language mapping has emerged as a gold standard in adults but remains poorly established in children, since the last systematic retrospective and prospective cohort studies review of 130 cases worldwide.[2] This is the first case of AC in a pediatric patient with a left temporal glioma, focusing on preoperative preparation, real-time intraoperative cortical language mapping, and postoperative outcomes in a series of 68 adult patients.

Case Description

A 14-year-old right-handed boy presented with recent-onset focal seizures with subtle word-finding difficulty. MRI revealed a non-enhancing T2-hyperintense lesion in the left posterior superior and middle temporal gyri—an area within the language-dominant hemisphere. (Figure 1)

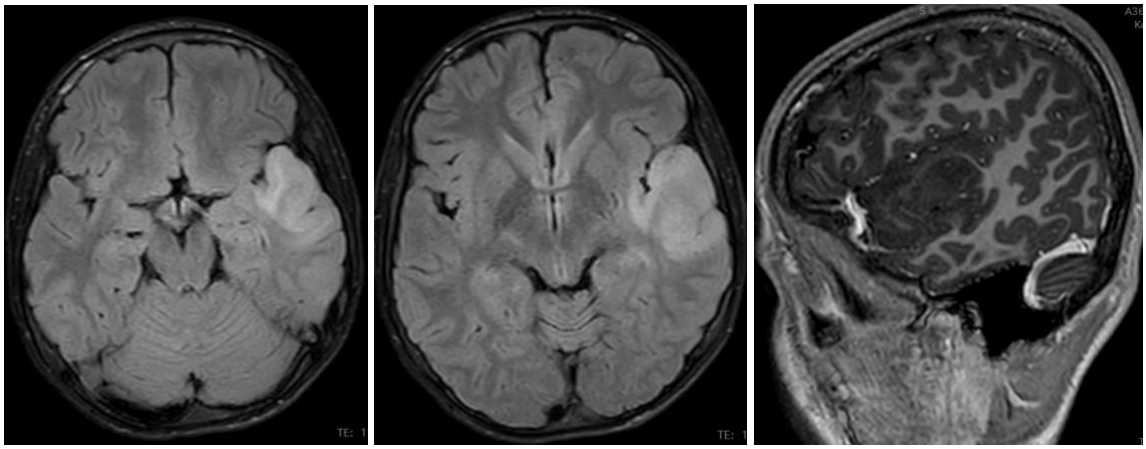

Figure 1: *MRI revealed a non-enhancing T2-hyperintense lesion in the left superior and middle temporal gyri with radiologic appearance of LGG*

On neurological examination, the patient was alert and oriented to time, place, and person. Cranial nerve function was preserved, and there were no focal motor or sensory deficits. Cerebellar function was intact, deep tendon reflexes were symmetric, and no signs of meningeal irritation were observed. NIHSS 0, GCS 15.

Neurocognition evaluation was carefully performed before surgery (Prof Z.Gjeci). The WMS-R mental subtest showed normal critical thinking, concentration, attention and task performing. There was no sign of an `epileptic personality`. The patient was alert and very cooperative. There was no evidence of hyperactive behavior, signs of psychosis, nor affective disorders (fear, anger, euphory) because the child is not aware of his medical condition. He has a normal IQ level. Mnesic and executive functions were normal. Speech maximal capacity wasn`t achieved: Boston Naming Test 78/80; Phonetic verbal fluency 8 words per minute; semantic verbal fluency 9 words per minute. Visio-spatial capacity was also mildly affected.

A comprehensive preparation program was initiated, including child-focused educational sessions with a neuropsychologist to enhance cooperation and reduce procedural anxiety.

Surgical Strategy

An asleep-awake-asleep (SAS) regimen was used. Induction was achieved with Propofol and ketamine, followed by local scalp block and discontinuation of anesthetics before cortical exposure. Dexmedetomidine was avoided due to concerns about bradycardia in this age group.

A tailored craniotomy exposed the temporal operculum. Direct cortical stimulation was performed using a bipolar electrode (60 Hz, 1–6 mA) over 1 cm^2 sites. Language testing tasks (counting, object naming, word reading) were repeated thrice per site during stimulation.

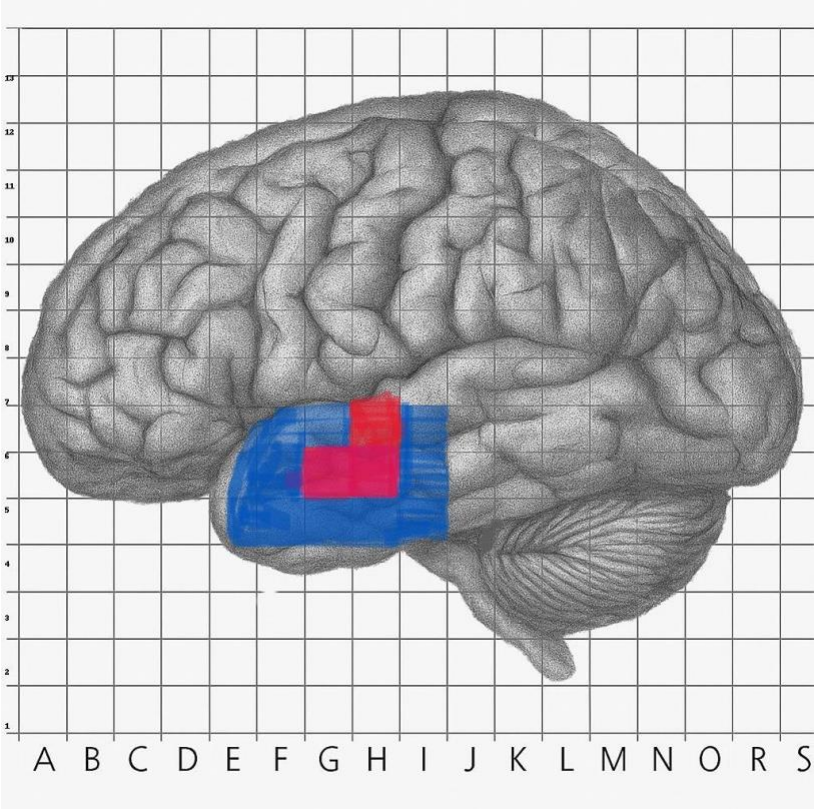

Figure 2: *This lateral view of the dominant-hemisphere cortex of the patient during stimulation realized according to the respective Neurosurgery[3] and NEJM studies[2] (F.Dashi, S.Dodaj, V.Leka), showing with the red dots the anomia area before resection.*

Stimulation-induced 1–6 mA anomia was observed in two cortical sites in the posterior superior temporal gyrus, confirming critical language cortex involvement (Figure 2 adapted from NEJM). Negative sites were delineated and mapped digitally with MRI navigation.

NTR was realized respecting the areas without provoking new deficits with continuous neurophysiological monitoring and testing by F.Dashi and the neurologists. Real-time speech monitoring was coordinated between the surgical team and the attending neuropsychologist.

No intraoperative complications or seizures occurred.

Postoperative Course

Near-total resection (residual <5%) was achieved. Immediate MRI confirmed NTR. (Figure 3). Postoperatively, the patient did not experience any episodes of anomia. No seizures or neurologic deficits were noted on follow-up. The patient was discharged on post-operative day 4.

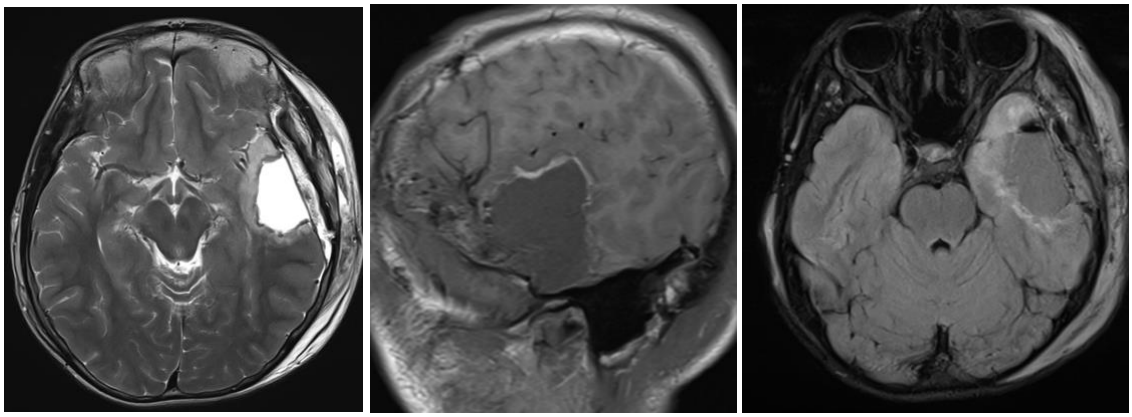

Figure 3: *Immediate MRI confirming NTR-resection*

Conclusion

This case underscores the benefits of AC with negative mapping for pediatric gliomas near eloquent cortex. Echoing the findings of Sanai et al. (2008), negative language mapping enabled resection with minimal cortical exposure and functional preservation. The only systematic review of pediatric ACs (Bhanja et al., 2023), supported this case to the growing evidence of safety and tolerability in children—especially when psychological preparation and anesthesia protocols are individualized.

References

1. Sanai N, Mirzadeh Z, Berger MS. Functional Outcome after Language Mapping for Glioma Resection. N Engl J Med. 2008;358:18-27.

2. Bhanja D, et al. Awake Craniotomies in the Pediatric Population: A Systematic Review. J Neurosurg Pediatr. 2023;32(4):428–436.

3. Kim, Stefan S. M.D.; McCutcheon al Awake craniotomy for brain tumors near eloquent cortex, correlation of intraoperative cortical mapping with neurological outcomes in 309 consecutive patients, Neurosurgery 64(5):p 836-846, May 2009.