
A case of awake craniotomy for tumor excision in an eloquent area managed with an intraoperative triple monitoring technique

Sir,

In the modern era of highly developed multimodal neuromonitoring, it is essential to precisely localize and total excise tumors without causing neurological deficits. Here, an awake craniotomy was performed utilizing the triple neuromonitoring method, resulting in no neurological deficit.

A 37-year-old lady was taken for surgery for diffuse left frontoparietal glioma and perilesional edema [Figure 1a].

Spectroscopy image showed an increase in choline, a decrease in the choline–creatinine ratio, and a decrease in *N*-acetyl aspartate and creatinine peak [Figure 1b]. A bilateral scalp block was given and dexmedetomidine 1 mcg/kg bolus followed by 0.7 mcg/kg/h infusion was started. The surgery was carried out utilizing a conscious sedation approach, and the patient was maintained awake throughout. A monopolar probe was used to map the Broca's, Wernicke's, and Arcuate fibers [Figure 2a].

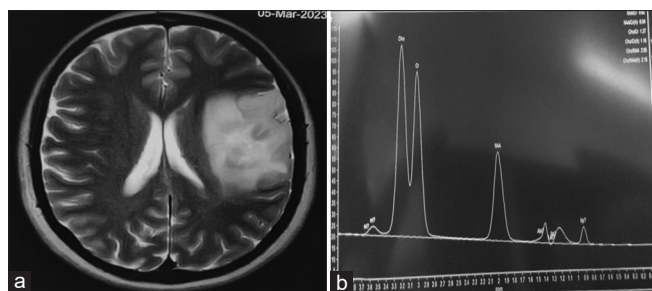


Figure 1: Left-hand magnetic resonance imaging showing left frontoparietal tumor with perilesional edema (a) and a right-hand image showing magnetic resonance spectroscopy suggestive of choline and creatinine peaks in tumor (b)

The patient was asked to identify images of a common animal and fruit throughout the procedure. Her name was questioned often, and instances of verbal apraxia, dysarthria, semantic paraphasia, and speech arrests were noted. The monopolar probe was used to define the tumor's margins and to determine the optimal extent for removal. To get through instances of painful stimulation, the patient needed brief injections of 0.3 mg/kg ketamine. Postoperatively, the patient was neurologically intact and following commands. The postoperative scan showed near-total excision [Figure 2b]. The very next day the patient was discharged home.

In the new era of neuromonitoring, there is evolved role of cortical and subcortical mapping, and speech mapping to prevent injury to the eloquent areas of the brain. Literature showed that almost 80% resection was possible when there was combined cortical and subcortical mapping.^[1] As speech association regions in the insula and arcuate gyrus are implicated, tumors affecting the inferior frontal and temporal areas are more likely to cause vocalization loss in these situations. In our case, the lesion involved most of the speech association areas and hence a triple monitoring technique was planned to prevent injury to the speech areas and at the same time maximally excise the tumor. The first approach was to do a simple cortisectomy and thus cortical mapping was taken. Then, the surgeon approached the tumor (subcortical mapping), and the extension was till the inferior frontal (Broca's area) to the temporal lobe along with the involvement of the arcuate fasciculus (arcuate fiber mapping).

Currently, the arcuate fibers linking the key speech regions may be mapped using diffuse tensor imaging, and preoperative functional area mapping of the brain can be used to assist and define the speech and language areas.^[2] By way of intraoperative mapping, we can find out speech-producing areas like subcallosal fasciculus (speech initiation), periventricular white matter (dysarthria), and

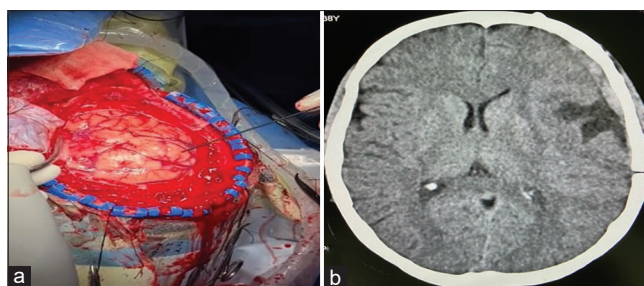


Figure 2: Left-hand image showing tumor lesion being mapped using a monopolar probe (a) and right-hand postoperative computed tomography scan showing total removal of tumor (b)

arcuate and insular connections (anomia).^[3] In this case, we were able to do all three mappings. There is also a role of negative cortical mapping with positive subcortical mapping in patients with tumors associated with the language areas.^[4] They also advocated that electrocorticography and electroencephalography-guided procedures can be used to differentiate seizures from true-positive mapping.

We concluded that triple monitoring should be the ideal monitoring technique while operating tumors near speech areas.

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Conflicts of interest

There are no conflicts of interest.

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