Perioperative Multimodal Evaluation and Surgical Tactics of Tumor-Related Epilepsy: 2-Dimensional Operative Video

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Treatment of tumor-related epilepsy (TRE), especially for tumors near critical areas, requires surgeons to strike a balance between the epileptic benefit and functional outcome after surgery. Here, we present a case in which multimodal evaluation facilitated the achievement of such surgical balance. Informed patient consent was obtained.

A 17-yr-old female presented with seizure attacks for 2 yr. Magnetic resonance imaging (MRI) revealed a right parietal mass lesion with hypointense signal on T1W imaging, hyperintense signal on T2W imaging, and homogeneous enhancement. Carbamazepine and valproate administration were unable to control the intermittent seizures. From the patient’s history and imaging, the initial diagnosis was refractory TRE.

Whether lesionectomy would achieve seizure freedom in this case was not certain. Therefore, dESI (dense array EEG source imaging) was used to localize the epileptic zone preoperatively; results showed that the epileptic zone was very close to the lesion in the primary motor cortex. Surgery was carried out under awake-anesthesia, with the aid of multimodal neuronavigation, intraoperative neurophysiological monitoring, and intraoperative MRI evaluation. A gross total lesion resection was achieved while preserving critical motor areas. Histopathology revealed ganglioglioma grade I diagnosis. No motor deficits following surgery were detected except slight increase of muscle tension in the right lower limb. At 6-mo follow-up, the patient was without any motor impairment or any other neurological deficits and completely seizure-free with the antiepileptic drug Carbamazepine 1200 mg/day.

KEY WORDS: Tumor-related epilepsy, Electroencephalographic source imaging, Intraoperative neurophysiological monitoring, Awake-anesthesia, Intraoperative-MRI, surgery

Disclosures
The authors have no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

COMMENTS
This is a nicely documented case of a low-grade ganglioglioma associated with medically refractory seizures. Resection produced a seizure-free outcome without associated morbidity. The magnetic resonance spectroscopy provided some reassurance that this enhancing lesion, which grew slightly under observation, was not a biologically aggressive tumor. Dense array electroencephalography source imaging provided non-invasive preoperative reassurance that lesionectomy would favorably impact seizure frequency, as did intraoperative electrocorticography. Neuronavigation and awake craniotomy helped obviate surgical morbidity. While the outcome might have been similar without the use...
of some of these “bells and whistles”, the clear delineation of this case and the excellent outcome deserve plaudits.

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The authors demonstrated the importance and utility of a multimodal preoperative workup for tumor-related epilepsy. For surgeons treating tumor-related epilepsy, determining the goals of surgery (either tumor or epilepsy-based surgery) remains paramount. As the authors demonstrate, a thorough preoperative workup including magnetic resonance spectroscopy, dense array electroencephalogram, and additional functional imaging (positron emission tomography, functional MRI, etc) may help confirm epileptogenic foci. The authors establish that the combination of these tests along with standard intraoperative techniques such as electrocortigraphy can corroborate the preoperative workup. Although a few of these tests may be superfluous, this case reveals that a thorough preoperative workup can certainly facilitate surgical decision-making.

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