

Beyond the Neuro-Oncological Outcome: A Perspective of the Seizure Control After Resection of the Medial Temporal Lobe Gliomas

Sir,

We read with great interest the article titled, “seizure outcome after lesionectomy with or without concomitant anteromedial temporal lobectomy for low-grade gliomas (LGGs) of the medial temporal lobe.” This study is a valuable effort to compare the epilepsy outcome in patients with mesial temporal LGG following two different strategies: lesion surgery alone and lesionectomy with anteromesial temporal resection (AMTR).

The mesial temporal area is related to the crucial neurovascular structures limiting the favorable extent of resection of the pathologies which involve this region. For LGGs located in or infiltrating the mesial temporal lobe, like all other gliomas, higher extent of resection is the cornerstone and the single-most important predictor of the oncological outcome of the patients in terms of overall and progression-free survival. On the other hand, the epileptologic outcome (seizure-freedom), one of the final targets in patients with lesional temporal lobe epilepsy (TLE), has also been suggested to be dependent on the complete epileptogenic zone resection.^[1] However, these two different aspects of the clinical outcome do not always move parallel to each other: some patients with partial resection of the tumor experience significant seizure control, while some others with apparently gross total resection of the tumor have a suboptimal epileptologic outcome.^[2] This discrepancy originates from shortages of our knowledge about the exact predicting factors of the best seizure outcome after lesionectomy in each patient. Hence, the epileptogenic zone can be larger or smaller than the apparent tumor.^[3] For instance, the type IIIb focal cortical dysplasia is defined as a coexistence of a benign glioneuronal tumor, which can be a part of the epileptogenic zone and naturally the reason for seizure recurrence after limited tumor resection.^[4]

Some studies reported that the supratotal resection of gliomas located in the temporal lobe (means anterior or anteromesial temporal lobectomy) is accompanied by a more favorable seizure outcome after the operation. They believe that LGGs are not limited to the area shown by MRI, and part of the normal temporal neocortex in preoperative imaging may also be involved by the tumor histologically.^[2,5-7]

We agree with the authors that optimal intervention for both oncological and an epileptologic outcome is total tumor removal along with resection of all probable epileptogenic foci. However, such a practice may be overdoing in some cases, posing them to the risks of an extended resection

without adding any benefit to the outcome. In order to identify which patients may need extended resection beyond a simple lesionectomy to achieve a favorable seizure outcome, it is necessary to perform a dedicated epileptologic workup in addition to the neuro-oncological studies for patients presenting with frequent seizures as their main clinical problem. In other words, we would support an “epilepsy surgery” concept to be applied in all pre-, intra-, and postoperative steps of the LGG patients whose main postoperative outcome will be dependent on the success of the “seizure control.” In this regard, further epileptologic assessments such as video-EEG monitoring, epilepsy protocol-adjusted MR modalities (so-called as Harmonized Neuroimaging of Epilepsy Structural Sequences or HARNES-MRI), and a comprehensive electropsychological evaluation may be needed.^[8] The electrophysiologic investigations should confirm the tumor to be the sole seizure onset zone using markers such as ictal activity and high-frequency oscillations, and the sophisticated MRI with post-processing evaluation should be able to rule out a dual pathology.^[9]

Despite all the controversies, there are some predictors of postoperative seizure control which should be addressed more precisely in the future studies. One of these predictors is the molecular biomarker status of the gliomas, including isocitrate dehydrogenase (IDH)-1 and 2 genes, 1p-19q loci, and the MGMT methylation rate status, which may influence the epilepsy outcome. It has been shown that IDH-1 mutation and MGMT gene promoter methylation and 1p-19q co-deletion are related to better postoperative seizure control significantly.^[2,10]

In addition, tumor volumetric information and tumor pattern in T2-weighted and T1-weighted MRI may have an essential role in seizure outcome following the mesial temporal glioma surgery. Indeed, the preoperative $\Delta T2T1$ MRI index $\leq 18 \text{ cm}^3$ improved seizure outcome significantly. Hence, describing the exact feature of the tumor in preoperative imaging can be helpful to estimate the rate of seizure control postoperatively.^[2]

It is interesting that the laterality of the glioma may also influence the seizure outcome, and the right or left-sided lesions have been reported to have different seizure control rates postoperatively. It has been postulated that the right hippocampus has greater brain-wide connectivity than the left side, which affects the seizure outcome. There is a significant relationship between longer epilepsy duration and right-sided epileptogenic focus and between a more severe seizure syndrome and posterior hippocampal sclerosis.^[11]

It has been proposed that temporal piriform cortex resection results in a more favorable seizure outcome. Therefore, the extent of the resected piriform cortex in patients with mesial temporal glioma operated via lesionectomy and AMTR could be a useful marker during the seizure outcome evaluations.^[12] Furthermore, the thalamic arousal centers may have abnormal connectivity with the occipital lobe in patients with TLE. Thus, the preoperative assessment of presence or absence of such connectivities may help estimate the success/failure of the seizure control after surgery.^[13]

Last but not the least, we would like to encourage our colleagues in the developing centers to organize dedicated joint epilepsy surgery meetings and to direct their practice based on the decisions made by such multifaceted dedicated teams. In the era that we have reached promising neuro-oncological achievements for patients with LGG and try to have a wider vision on the other qualitative aspects of the patient outcome, we are urged to have a more comprehensive set of armamentarium considering the fact that “more needs more.”

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Conflicts of interest

There are no conflicts of interest.

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References

- Mohan AC, Weiner HL, Mohila CA, Adesina A, Chintagumpala M, Curry D, *et al.* Epilepsy outcome following resection of low-grade brain tumors in children, *Journal of Neurosurgery Pediatrics* 2019;23:726-731.
- Ius T, Pauletto G, Tomasino B, Maieron M, Budai R, Isola M, *et al.* Predictors of postoperative seizure outcome in low grade glioma: From volumetric analysis to molecular stratification. *Cancers (Basel)* 2020;12:397.
- Lüders HO, Najm I, Nair D, Widdess-Walsh P, Bingman W. The epileptogenic zone: General principles. *Epileptic Disorders* 2006;8:1-9.
- Blümcke I, Thom M, Aronica E, Armstrong DD, Vinters HV, Palmini A, *et al.* The clinicopathologic spectrum of focal cortical dysplasias: A consensus classification proposed by an ad hoc Task Force of the ILAE Diagnostic Methods Commission. *Epilepsia* 2011;52:158-74.
- Akgun MY, Cetintas SC, Kemerdere R, Yeni SN, Tanriverdi T. Are low-grade gliomas of mesial temporal area alone? *Surg Neurol Int* 2019;10:170.
- Borger V, Hamed M, Ilic I, Potthoff AL, Racz A, Schäfer N, *et al.* Seizure outcome in temporal glioblastoma surgery: Lobectomy as a supratotal resection regime outclasses conventional gross-total resection. *J Neurooncol* 2021;152:339-46.
- Kemerdere R, Yuksel O, Kacira T, Yeni N, Ozkara C, Tanriverdi T, *et al.* Low-grade temporal gliomas: Surgical strategy and long-term seizure outcome. *Clin Neurol Neurosurg* 2014;126:196-200.
- Bernasconi A, Cendes F, Theodore WH, Gill RS, Koepp MJ, Hogan RE, *et al.* Recommendations for the use of structural magnetic resonance imaging in the care of patients with epilepsy: A consensus report from the International League Against Epilepsy Neuroimaging Task Force. *Epilepsia* 2019;60:1054-68.
- Höller Y, Kuil R, Klaffenböck L, Thomschewski A, Höller PM, Bathke AC, *et al.* High-frequency oscillations in epilepsy and surgical outcome. A meta-analysis. *Front Hum Neurosci* 2015;9:574.
- Feyissa AM, Worrell GA, Tatum WO, Chaichana KL, Jentoft ME, Guerrero Cazares H, *et al.* Potential influence of IDH1 mutation and MGMT gene promoter methylation on glioma-related preoperative seizures and postoperative seizure control. *Seizure* 2019;69:283-9.
- Mansouri A, Germann J, Boutet A, Elias GJ, Karmur B, Neudorfer C, *et al.* An exploratory study into the influence of laterality and location of hippocampal sclerosis on seizure prognosis and global cortical thinning. *Sci Rep* 2021;11:4686.
- Borger V, Schneider M, Taube J, Potthoff AL, Keil VC, Hamed M, *et al.* Resection of piriform cortex predicts seizure freedom in temporal lobe epilepsy. *Ann Clin Transl Neurol* 2021;8:177-89.
- Wills KE, González HF, Johnson GW, Haas KF, Morgan VL, Narasimhan S, *et al.* People with mesial temporal lobe epilepsy have altered thalamo-occipital brain networks. *Epilepsy Behav* 2021;115:107645.

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