Awake surgery for insular glioma

- Potential predictors of awake surgery failure for insular glioma
- A series of 309 awake surgeries with transcortical approach for IDH-mutant low-grade glioma involving the insula: long-term onco-functional outcomes in 253 consecutive patients
- Feasibility, Safety, and Impact of Awake Resection for Recurrent Insular Diffuse Gliomas in Adults
- A Journey into the Complexity of Temporo-Insular Gliomas: Case Report and Literature Review
- Mini-strokes within Broca-caudate connections during left insular glioma awake surgery cause transient severe naming deficits
- Exploring cognitive Landscapes: Longitudinal Dynamics of left insula gliomas using neuropsychological inquiry, fMRI, and intra-resection real time neuropsychological testing
- Insular Gliomas. Experience in a Latin American Center and Assessment of Variables Related to Surgical Management and Prognosis
- Surgical treatment for insular gliomas. A systematic review and meta-analysis on behalf of the EANS neuro-oncology section

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The details of awake craniotomy have been described elsewhere by Berger and colleagues [1) 2) 3)].

Predictors of Awake Surgery Failure for Insular Glioma

Awake craniotomy is a key strategy for maximizing safe resection in insular glioma surgery, especially when tumors are close to eloquent areas. However, several factors can predict failure of awake protocols, such as conversion to general anesthesia, incomplete mapping, or interruption of surgery.

Patient-Related Predictors

- **High anxiety or psychiatric disorders**
  - Risk of panic attacks or inability to tolerate awake conditions.
- **Low cognitive reserve or baseline neuropsychological deficits**
  - Impaired cooperation with intraoperative tasks (e.g., language or attention testing).
- **Poor understanding or low motivation**
  - Inadequate preoperative education may lead to intraoperative refusal or confusion.
- **Obstructive sleep apnea, obesity, or other comorbidities**
  - Increased risk of hypoxia or airway compromise under sedation.
- **Language barrier**
  - Non-native speakers may struggle during language mapping tasks.

Tumor-Related Predictors

- **Tumor location in posterior insula (zones III–IV)**
  - More difficult access, increased discomfort, or higher risk of neurological deficit.
- **Involvement of operculum or internal capsule**
  - Associated with greater surgical complexity and higher stress on the patient.
- **High-grade gliomas or extensive edema**
  - May lead to intraoperative seizures or neurological deterioration.
- **Large tumor volume**
  - Longer duration of mapping, leading to fatigue and reduced cooperation.

Surgical and Technical Predictors

- **Inadequate preoperative simulation or training**
  - Lack of rehearsal of tasks may cause confusion during awake mapping.
- **Inexperienced surgical or anesthetic team**
  - Increases risk of technical errors and poor sedation control.
- **Suboptimal sedation management**
  - Undersedation: anxiety or movement; oversedation: decreased arousal.
- **Intraoperative seizures**
  - May lead to interruption of mapping and switch to general anesthesia.
- **Prolonged surgical time**
  - Fatigue and patient discomfort contribute to poor cooperation.

Basal ganglionic involvement, which means the high-intensity area on Fluid Attenuated Inversion Recovery imaging is found in the basal ganglia consisting of the striatum and globus pallidus, was significantly associated with AS failure. AS contributes significantly to the maximal resection of IG. Basal ganglionic involvement is a potential predictor of AS failure for IG [4].

Case series

2017

Of the 52 identified patients, 24 had awake surgery and 28 had surgery under GA. The extent of resection was similar for the two anesthesia techniques: the median extent of resection was 61.4% (IQR: 37.8-74.3%) in the WHO grade <4 AC group vs. 50.5% (IQR: 35.0-71.2%) in the grade <4 GA group and 73.4% (IQR: 54.8-87.2%) in the grade 4 AC group vs. 88.6% (IQR: 61.2-93.0%) in the grade 4 GA group. Consistent with literature, there were more early neurological deficits after an AC, while the GA group showed more new late neurological deficits; however, these trends were not significant. Survival was similar between the two groups, with 100% 1- and 2-year survival in the grade <4 groups.

The results showed that the extent of resection, neurological outcomes, and survival were similar using the two anesthesia techniques. Since AC is more challenging for the patient and for his or her

caregiver after surgery, this finding has implications for clinical decision-making [5].

Motomura et al. retrospectively reviewed the records of 33 consecutive patients with glial tumors in the eloquent brain areas who underwent awake surgery using iMRI. Volumetric analysis of MRI studies was performed. The pre-, intra-, and postoperative tumor volumes were measured in all cases using MRI studies obtained before, during, and after tumor resection. RESULTS Intraoperative MRI was performed to check for the presence of residual tumor during awake surgery in a total of 25 patients. Initial iMRI confirmed no further tumor resection in 9 patients (36%) because all observable tumors had already been removed. In contrast, intraoperative confirmation of residual tumor during awake surgery led to further tumor resection in 16 cases (64%) and eventually an EOR of more than 90% in 8 of 16 cases (50%). Furthermore, EOR benefiting from iMRI by more than 15% was found in 7 of 16 cases (43.8%). Interestingly, the increase in EOR as a result of iMRI for tumors associated mainly with the insular lobe was significantly greater, at 15.1%, than it was for the other tumors, which was 8.0% ($p = 0.001$).

This study revealed that combining awake surgery with iMRI was associated with a favorable surgical outcome for intrinsic brain tumors associated with eloquent areas. In particular, these benefits were noted for patients with tumors with complex anatomy, such as those associated with the insular lobe [6].

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