Insuloopercular glioma

Surgical treatment of insulo-opercular gliomas carries a high risk for postoperative deficits caused by damage to the functional cortical regions, subcortical motor/language fibers, and vascular structures ¹⁾.

Improving the extent of resection and reducing the risk for neurological complications could be achieved by better understanding of the surgical anatomy, application of adjunctive methods (e.g., motor tract mapping by intermittent electrical cortical-subcortical stimulations or continuous motor evoked potential monitoring), and use of awake surgery ^{2) 3) 4)}.

Selection of ideal patient candidates for radical resection is also useful for risk reduction. Various indications for selection have been advocated, such as characteristics of the tumor boundaries, ⁵⁾ involvement of the lenticulostriate arteries, ⁶⁾ and the Berger Sanai classification of insular glioma ⁷⁾.

The sharp medial tumor border, which is clearly separated from the basal ganglia, is more amenable to radical resection. In contrast, tumors with diffuse boundaries on T2-weighted MRI are less amenable to radical resection. In the series of Kawaguchi et al, gross-total resection was achieved for 75.7% of tumors with clear boundaries but only for 19.6% of tumors with ambiguous boundaries (p < 0.001). This result indicates that ambiguous tumor boundaries are a risk for unsatisfactory resection.

Enhancement of the tumor by gadolinium also indicates tumor character. Well-enhanced tumors are considered to be rich in vasculature. This findings indicate that postoperative neurological deficits are more frequent among patients with well-enhanced tumors.One possible explanation is tumor vascularity.⁸⁾.

Lenticulostriate arteries

Fine vessels, such as the lenticulostriate arteries, pass along the tumor boundaries, and these vessels should be preserved. However, such vessels are not easy to differentiate from the tumor vessels during resection of a hypervascular tumor. Also, postoperative progression was more frequent for enhanced tumors, although the resection rate was equivocal. This finding is not surprising because tumor enhancement is considered to be an indicator of tumor malignancy and poor prognosis ⁹.

Preservation of the lenticulostriate arteries is another factor that helps avoid complications during aggressive resection of insulo-opercular gliomas. Damage to the lenticulostriate arteries can be directly associated with neurological deterioration, especially motor dysfunction, so the position of the lenticulostriate arteries is quite relevant for planning radical resection of insulo-opercular gliomas¹⁰.

Resection can damage the long insular arteries, resulting in ischemia at the pyramidal tract ¹¹.

Case reports

A 30-year-old right-handed female medical doctor experienced generalized seizures. MRI showed a left operculo-insular low-grade glioma. Awake resection was proposed. During the cortical mapping, counting and naming task combined with right upper limb movement enabled the identification of the ventral premotor cortex and negative motors areas. The so-called Broca's area was not eloquent.

Subpial dissection was performed by avoiding coagulation until the inferior fronto-occipital fasciculus and the junction between the output projection fibers and the anterior part of the superior longitudinal fasciculus III were reached. The patient resumed a normal familial and socio-professional life despite the resection of Broca's area. The video can be found here: https://youtu.be/OALk0tvctQw¹².

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