Awake Brain Mapping

It has been demonstrated that brain mapping in an awake patient is a very reliable tool for brain tumor resection, allowing us to maximize the extent of resection while minimizing the functional risk [1].

This methodology is becoming more and more popular, and different teams have introduced many new tasks in their intraoperative battery, for motor functions [2] as well as for cognitive functions [3] [4].

Awake brain mapping is not an additional surgical technique but an alternative philosophy in the management of Low-grade glioma patients [5].

During resection of intrinsic brain tumors in eloquent areas, particularly under awake mapping, subcortical stimulation is mandatory to avoid irreversible deficits by damaging white fiber tracts. The current practice is to alternate between subcortical stimulation with an appropriate probe and resection of tumoral tissue with an ultrasound aspiration device. Switching between different devices induces supplementary movement and possible tissue trauma, loss of time, and inaccuracies in the localization of the involved area.

The tip of different ultrasound aspiration devices is currently used for monopolar current transmission (e.g., for vessel coagulation in liver surgery). Colle et al. used the same circuitry for monopolar subcortical stimulation when connected with the usual stimulator devices.

They have applied this method since 2004 in over 500 patients during tumor resection with cortical and subcortical stimulation, mostly with awake language and motor monitoring.

A method is presented using existing stimulation and wiring devices by which simultaneous subcortical stimulation and ultrasonic aspiration are applied with the same tool. The accuracy, safety, and speed of intrinsic intracranial lesion resection can be improved when subcortical stimulation is applied [6].

Videos

Awake Brain Mapping in Dominant Side Insular Glioma Surgery: 2 Dimensional Operative Video [7].

1)
De Witt Hamer PC, Robles SG, Zwinderman AH, Duffau H, Berger MS. Impact of intraoperative stimulation brain mapping on glioma surgery outcome: a meta-analysis. J Clin Oncol. 2012;30(20):2559-2565.
2)
Rossi M, Fornia L, Puglisi G, et al. Assessment of the praxis circuit in glioma surgery to reduce the incidence of postoperative and long-term apraxia: a new intraoperative test. J Neurosurg. 2018;130(1):17-27.
3)
Skrap M, Marin D, Ius T, Fabbro F, Tomasino B. Brain mapping: a novel intraoperative neuropsychological approach. J Neurosurg. 2016;125(4):1-11.
4)

Wager M, Du Boisgueheneuc F, Pluchon C, et al. Intraoperative monitoring of an aspect of executive functions: administration of the Stroop test in 9 adult patients during awake surgery for resection of frontal glioma. Neurosurgery. 2013;72(2 Suppl Operative):ons169-180; discussion ons180-181.
5)

Duffau H. Awake mapping is not an additional surgical technique but an alternative philosophy in the management of low-grade glioma patients. Neurosurg Rev. 2017 Dec 13. doi: 10.1007/s10143-017-0937-6. [Epub ahead of print] PubMed PMID: 29236183.
6)

Colle H, Colle D, Noens B, Dhaen B, Alessi G, Muller P, Aerts A, Robert E, van der Linden C. Subcortical Stimulation with Tip of Ultrasound Aspirator. J Neurol Surg A Cent Eur Neurosurg. 2021 Aug 25. doi: 10.1055/s-0039-1691824. Epub ahead of print. PMID: 34433223.
7)

Hameed NUF, Zhu Y, Qiu T, Wu J. Awake Brain Mapping in Dominant Side Insular Glioma Surgery: 2-Dimensional Operative Video. Oper Neurosurg (Hagerstown). 2018 Feb 16. doi: 10.1093/ons/opx299. [Epub ahead of print] PubMed PMID: 29471530.