Transopercular approach

Temporocentric tumors induce a lateral fiber shift. For those tumors, a transsylvian-transopercular approach is recommended [1].

Advances in the oncological and functional results of insular surgery have been reported recently. Such successes have been made possible by the advent of the transopercular approach under awake monitoring and by the improved anatomical and functional knowledge of the white matter pathways surrounding the insula. Nonetheless, given the rarity of insular tumors, it is difficult to get familiar with the complex 3D anatomy of the different neuronal and vascular structures encountered during a transopercular insular resection. Mandonnet et al., thus propose to develop a laboratory model allowing to train transopercular approaches of the insula

Two hemispheres prepared with Klingler method were dissected under light microscope, preserving all pial membranes. The different steps of the dissection were video recorded.

The preservation of pial membranes enabled to simulate subpial resection, both during operculum removal and during insular cortex resection. The medial wall of the resection was defined by the inferior-fronto-occipital fasiculus, protecting from the lenticulostriate arteries.

In this paper, Mandonnet et al., show that Klinger dissection with preservation of pial membranes provides a realistic model of insular surgery, allowing to learn and train this highly-specialized surgery [2].

A transopercular approach to insuloopercular gliomas can generate Foix-Chavany-Marie syndrome (FCMS), especially in cases of previous contralateral lesions. The prognosis is favorable, but the patient should be informed of this particular hazard, and the surgeon should anticipate the surgical strategy in case the syndrome occurs intraoperatively in an awake patient [3].

Case series

Since 2010, surgical resection of insular gliomas is performed via transopercular approach by the Neurosurgery Clinic, Istanbul Training and Research Hospital, Departments of Neurosurgery, Cerrahpasa Medical Faculty, Istanbul University, Turkey.

Clinical, surgical and follow-up results were analyzed retrospectively.

The majority were low-grade (81.8%) and among them oligodendroglioma was the most common (n = 8). Half of the patients underwent awake craniotomy with cortical electrostimulation and total resection was achieved in 6 patients. Long-term follow-up showed the majority of patients (90.9 %) were completely seizure free. Only one patient showed slight paresis on one upper extremity at the long-term follow-up.

Trans-opercular approach for insular gliomas is safe and maximal resection with minimal neurological deficits is possible. Use of ultrasonic aspirator and neuronavigation make surgery safer. Surgery-related complication is very rare. Future studies should contain larger number of patient and long-

term follow-up in order to provide more accurate data [4].

Gras-Combe et al., report 6 consecutive cases of right insular resection performed based on anatomoelectroclinical correlations provided by SEEG.

Six right-handed patients (3 male, 3 female) with drug-resistant epilepsy underwent comprehensive presurgical evaluation. Based on video electroencephalographic recordings, they all underwent SEEG evaluation with bilateral (n = 4) or unilateral right (n = 2) insular depth electrode placement. All patients had both orthogonal and oblique (1 anterior, 1 posterior) insular electrodes (n = 4-6 electrodes). Preoperative magnetic resonance imaging findings were normal in 4 patients, 1 patient had right insular focal cortical dysplasia, and 1 patient had a right opercular postoperative scar (cavernous angioma). All patients underwent right partial insular corticectomy via the subpial transopercular approach.

Intracerebral recordings demonstrated an epileptogenic zone confined to the right insula in all patients. After selective insular resection, 5 of 6 patients were seizure free (Engel class I) with a mean follow-up of 36.2 months (range, 18-68 months). Histological findings revealed focal cortical dysplasia in 5 patients and a gliosis scar in 1 patient. All patients had minor transient neurological deficit (eg, facial paresis, dysarthria).

Insular resection based on SEEG findings can be performed safely with a significant chance of seizure freedom [5].

Case reports

Metellus et al., report the case of a successful resection of a left insular glioma in a native deaf signer during an awake craniotomy.

Subject A.G., a congenitally deaf right-handed patient who is a native user of Sign Language, presented a seizure one week before he was referred to our department. MRI-scan revealed a left heterogenous insular tumor enhanced after intra-venous gadolinium infusion. Due to its deep and dominant hemisphere location an awake craniotomy was decided. Subject A.G. was evaluated intraoperatively using object naming, text reading and sign repetition tasks. An isolated inferior frontal gyrus site evoked repeated object naming errors. A transopercular parietal approach was performed and allowed the successful removal of the tumor under direct electric stimulation and electrocorticography. This is the first report of successful removal of a left insular tumor without any functional sequaelae in a native deaf signer using intraoperative direct cerebral stimulation during an awake craniotomy.

The methodology used also provided first evidence of the actual anatomo-functional organization of language in deaf signers [6].

2012

A 25-year-old right-handed man with an incidentally diagnosed right frontotemporoinsular tumor underwent surgery using an asleep-awake-asleep technique with direct cortical and subcortical electrical stimulation and a transopercular approach to the insula. While resecting the anterior part of

the pars opercularis the patient suffered sudden anarthria and bilateral facial weakness. He was unable to speak or show his teeth on command, but he was able to voluntarily move his upper and lower limbs. This syndrome lasted for 8 days. Postoperative diffusion tensor imaging tractography revealed that connections of the pars opercularis of the right inferior frontal gyrus with the frontal aslant tract (FAT) and arcuate fasciculus (AF) were damaged. This case supplies evidence for localizing the structural substrate of FCMS. It was possible, for the first time in the literature, to accurately correlate the occurrence of FCMS to the resection of connections between the FAT and AF, and the right pars opercularis of the inferior frontal gyrus. The FAT has been recently described, but it may be an important connection to mediate supplementary motor area control of orofacial movement. The present case also contributes to our knowledge of complication avoidance in operculoinsular surgery. A transopercular approach to insuloopercular gliomas can generate Foix-Chavany-Marie syndrome (FCMS), especially in cases of previous contralateral lesions. The prognosis is favorable, but the patient should be informed of this particular hazard, and the surgeon should anticipate the surgical strategy in case the syndrome occurs intraoperatively in an awake patient [7].

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