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Mapping of Broca's area with preoperative magnetic and intraoperative electric stimulation in awake surgeries

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Navigated transcranial magnetic stimulation (nTMS) can be used to elicit corticobulbar motor evoked potentials (CoMEP) in cricothyroid muscle, where long latency response (LLR) represents Broca's area function. Similarly, brain mapping of motor speech areas in awake surgeries uses direct cortical electrical stimulation (DCS) with short train of stimuli (STS) technique, and causes speech arrest with LLRs recording. However, whether both methods can be combined in awake surgeries remains unclear. Our primary focus is to explore the use of preoperative nTMS and intraoperative STS DCS brain mapping during glioma awake surgeries. 10 patients presented with expressive dysphasia, epileptic seizures, and/or prolonged periods of impaired consciousness. Magnetic resonance imaging (MRI) confirmed tumors in left frontal region in all patients. Preoperative nTMS brain mapping was visualized trough 3D neuronavigation system. During the awake surgeries nTMS cortical spots were confirmed by DCS, and caused speech arrests with LLR. Suction mapping device for subcortical brain mapping was used during tumor extirpations. The postoperative course went without complications. Patients preserved receptive language functions, exhibiting only slight and temporary difficulties in speech fluency. The preoperative nTMS was useful in planning and facilitating the DCS mapping of motor speech areas during awake brain surgeries. More cases are needed to report further on the double mapping methods.

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