Precentral gyrus glioma case series

Since 2005, Saito et al., removed gliomas in the precentral gyrus with combined functional mapping and estimation of intraoperative voluntary movement (IVM) during awake craniotomy and transcortical motor evoked potentials (MEPs).

The purpose of a study published in 2019 was to evaluate whether intraoperative findings of combined monitoring of IVM during awake craniotomy and transcortical MEP monitoring were useful for predicting postoperative motor function of patients with gliomas in the precentral gyrus.

The current study included 30 patients who underwent resection of precentral gyrus gliomas during awake craniotomy from April 2000 to January 2018. All tumors were removed with monitoring of IVM during awake craniotomy and transcortical MEPs. Postoperative motor function was classified as stable or declined, with the extent of decline categorized as mild, moderate, or severe. We defined moderate and severe deficits were those that hindered daily life.

In 28 of 30 cases, available waveforms were obtained with transcortical MEPs. The mean extent of resection (EOR) was 93%. Relative to preoperative status, motor function 6 months after surgery was considered stable in 20 patients and was considered to show mild decline in 7, moderate decline in 2, and severe decline in 1. Motor function 6 months after surgery was significantly correlated with IVM ($p = 0.0096$), changes in transcortical MEPs (decline ≤ or > 50%) ($p = 0.0163$), EOR, and ischemic lesions on postoperative MRI. Six patients with no change in IVM showed stable motor function 6 months after surgery. Only 2 patients with a decline in IVM and a decline in MEPs ≤ 50% had a decline in motor function 6 months after surgery (18%; 2/11 patients), whereas 11 patients with a decline in IVM and a decline in MEPs > 50% had such a decline in motor function (73%; 8/11 patients) including 2 patients with moderate and 1 with severe deficits. Three patients with moderate or severe motor deficits showed the lowest MEP values (< 100 μV).

Combined judgment from monitoring of intraoperative voluntary movement (IVM) during awake craniotomy and transcortical motor evoked potentials (MEPs) is useful for predicting postoperative motor function during removal of precentral gyrus gliomas. Maximum resection was achieved with an acceptable morbidity rate. Thus, these tumors should not be considered unresectable [1].

2016

From a consecutive series of 100 patients that were operated with intraoperative monitoring, 14 patients were retrospectively selected and analyzed for results of (sub)cortical electrical stimulation, extent of resection and temporary or permanent neurological deficits.

In 10 of 14 patients there were no neurological deficits prior to surgery despite tumor-infiltrated precentral gyrus. Resection of these tumors was (severely) limited in 6 patients due to cortical or subcortical responses from precentral gyrus or corticospinal tract. These responses reflected limb or speech/language functions. In 2 patients the tumor was not resected or only partially removed due to the confounding influence of seizures during the operation. Overall, 4 tumors were completely resected. In one patient this resulted in a new and permanent minor motor deficit of the foot.

The chance that a glioma can be resected from the upper parts of the precentral gyrus is low, especially in those cases where tumor margins are diffuse. Possible exceptions are gliomas that are hypointense on T1-weighted images and have sharp margins; these patients should a priori not be

excluded from surgery. Teunissen et al., could confirm previous reports in the literature that gliomas in the face area of the non-dominant hemisphere can be resected without permanent morbidity [2].

1)
Saito T, Muragaki Y, Tamura M, Maruyama T, Nitta M, Tsuzuki S, Fukuchi S, Ohashi M, Kawamata T. Awake craniotomy with transcortical motor evoked potential monitoring for resection of gliomas in the precentral gyrus: utility for predicting motor function. J Neurosurg. 2019 Mar 15:1-11. doi: 10.3171/2018.11.JNS182609. [Epub ahead of print] PubMed PMID: 30875689.
2)
Teunissen F, Verheul J, Rutten GJ. Functionality of glioma-infiltrated precentral gyrus: experience from 14 patients. J Neurosurg Sci. 2017 Apr;61(2):140-150. doi: 10.23736/S0390-5616.16.03268-9. Epub 2015 Jun 17. PubMed PMID: 26082382.