

Subcortical motor mapping

[Subcortical motor mapping](#) is crucial to ensure preservation of [motor tracts](#) during [resections](#) of [tumors](#). Continuous dynamic mapping using a modified [monopolar suction probe](#) is a novel and effective way of achieving this.

Moiyadi et al. from the Neurosurgical Services, Department of Surgical Oncology, Tata Memorial Centre, Homi Bhabha National University, Mumbai, India. Department of Neurosurgery, Inselspital, Bern University Hospital, Switzerland, Department of Neurosurgery, Adyar Cancer Institute, Chennai, describe their experience using this technique.

40 patients were operated between June 2017 and February 2018. Transcranial (TESMEP) and direct cortical strip MEPs (DCSMEPs) were monitored. Subcortical mapping (SCS) was attempted in all cases by adapting the technique using a monopolar suction stimulator. Neurological outcomes and extent of resection were analysed.

Motor fibres were between 0-7.6mm away from the tumor boundaries in 26 cases. TES MEP were monitored in all. DCS_MEPs were attempted in 31 and successfully monitored in 26 cases. SCS using the monopolar suction probe worked in all except one case. SCS elicited no responses at 15mA thresholds (MT) in 16 cases. The MT ranged from 3-10mA in the rest. Overall, MEP changes were noted in 5 cases. 10 patients experiences neurological worsening (6 transient, 3 prolonged and 1 delayed). There was no permanent deficit at 3 months. DCSMEPs predicted neurological worsening better than TESMEPs. Radical resections were achieved in 68%. Neuromonitoring inputs resulted in premature termination of resection in 14 cases (35%). Radical resections (NTRs) were still achieved in 8 of the 14 cases.

Continuous dynamic subcortical mapping is a reliable method to map the motor tracts. This is crucial to correctly identify truly eloquent tumors and tailor the surgical procedure as per planned goals, maximizing the resections with acceptable morbidity ¹⁾.

The intra-operative use of neurophysiological techniques allows reliable identification of the sensorimotor region, and constitutes a prerequisite for its anatomical and functional preservation. The present prospective study combines monopolar cortical stimulation (MCS) with the recording of phase reversal of somatosensory evoked potentials (SEP-PR) in a protocol for the intra-operative mapping of the motor cortex. Functional mapping of the motor cortex by SEP-PR and MCS was performed in 70 patients during surgery in and around the motor cortex. The central sulcus was identified by SEP-PR. Cortical motor mapping was then performed by monopolar anodal (400 Hz) stimulation. Motor responses were recorded by needle electrodes placed in the muscles of the contralateral extremities. Surgery was performed under general anaesthesia without muscle relaxants. Intra-operative localization of the central sulcus by SEP-PR was possible in 68 patients (97.14%). Motor evoked potentials (MEP) were elicited following MCS in 67 cases (95.7%). In 3 cases no MEP was recorded, not even after maximal stimulation intensity, the central sulcus being localized by SEP-PR only. On the other hand, MCS allowed localizing the motor cortex in the 2 cases with no recordable SEP-PR. Thus, combining SEP-PR and MCS allowed intra-operative localization of the sensorimotor cortex in 100% of the cases ²⁾.

¹⁾

Moiyadi A, Velayutham P, Shetty P, Seidel K, Janu A, Madhugiri V, Singh V, Patil A, John R. Combined

motor evoked potential monitoring and subcortical dynamic mapping in motor eloquent tumors allows safer and extended resections. World Neurosurg. 2018 Aug 20. pii: S1878-8750(18)31829-1. doi: 10.1016/j.wneu.2018.08.046. [Epub ahead of print] PubMed PMID: 30138733.

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