Pre-emptive diagnosis of cerebral ischemia during carotid endarterectomy with transcranial motor evoked potential monitoring under general anesthesia

Dear Editor,

A 74-year-old male patient with bilateral carotid artery stenosis was posted for right carotid endarterectomy (CEA) as he was symptomatic for right artery stenosis (65% stenosis at carotid bulb). General anesthesia (GA) with multimodal neuromonitoring was planned for this patient. We monitored electroencephalography (EEG), transcortical motor evoked potential (tcMEP), somatosensory evoked potential (SSEP), and bilateral cerebral oxygenation using bifrontal near-infrared spectroscopy (NIRS). Anesthesia was maintained using effect-site target-controlled propofol infusion at 2 μg/mL, intermittent fentanyl boluses, and sevoflurane with MAC of 0.3–0.4. Baseline tcMEP, median SSEP, and EEG were recorded [Figure 1a].

During the arteriotomy following the carotid clamping, contralateral MEP disappeared. However, SSEP and EEG frequencies did not change [Figure 1a]. Therapeutic rise of blood pressure and placing arterio-arterial shunt did not normalize tcMEP. Ten minutes into the surgery, left median nerve SSEP amplitude reduced >50% and EEG revealed right ischemic changes [Figure 1b and c]. NIRS values remained same (in the range of 65%–70%) as baseline. Arterial plaque was removed and surgery was completed. Total duration of surgery was 2 h. Immediate postoperative MR-angiography revealed non-visualization of right distal ICA [Figure 1d] with watershed infarcts. Digital subtraction angiography revealed proximal right ICA dissection with slowing of distal flows [Figure 1e] for which stenting was done and tirofiban infusion was started. Following stenting, the distal ICA flows

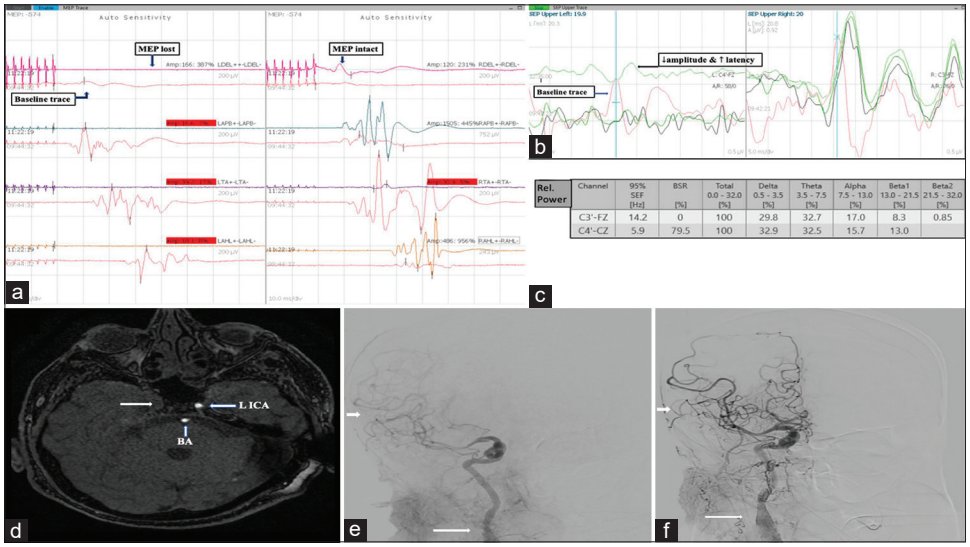

Figure 1: Intraoperative baseline transcranial motor evoked potential (tcMEP) recording and post-arteriotomy loss of left side tcMEPs (a), and changes in the left median nerve somatosensory evoked potential (SSEP) as compared to the baseline (b), and changes in the relative power of the frequencies on electroencephalography (EEG) (c) during the carotid plaque removal. Immediate post-operative MR-angiography (d) revealed non-visualization of right internal carotid artery (ICA) with visualization of left internal carotid (L ICA) and basilar artery (BA) (indicated by arrows). Digital subtraction angiography, shows proximal ICA dissection (pointed by arrow) with poor distal cerebral flows (e) which improved following carotid stenting (f)

resumed sparing few terminal MCA territories [Figure 1f]. Patient was extubated on postoperative day 6, and discharged on day 20 with left-sided weakness (Medical Research Council score of 1/5 in upper and 4/5 in lower limb) and Modified Rankin Scale score of 3.

Time and again the available literature suggest the utility of tcMEP over or along with the SSEP and EEG monitoring during CEA under GA.[1-3] Although the role of SSEP and EEG is well established,[4,5] recent studies show favorable results with the use of tcMEP in CEA under GA.[1-3] We observed instantaneous loss of contralateral MEP, whereas SSEP and EEG changed only after 10–15 min after MEP loss. Distinct intraoperative MEP changes in this case allowed the rapid diagnosis of the intraoperative complication, to take preventive measures to reduce further ischemia and orchestrate the subsequent immediate postoperative course of action. This in turn saved the patient, who may have had worst prognosis in the absence of early diagnosis. Though EEG and SSEP are considered as the standard neurophysiological monitoring during CEA, utility of MEP cannot be overemphasized.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Rohini M. Surve, Suparna Bharadwaj, Dwarakanath Srinivas[1], Anju JL

Departments of Neruroanesthesia and Neurocritical Care, and [1]Neurosurgery, National Institute of Mental Health and Neurosciences, Bengaluru, Karnataka, India

Address for correspondence: Dr. Rohini M. Surve, Department of Neuroanaesthesia and Neurocritical Care, Neurocentre Faculty Block, 3rd Floor, National Institute of Mental Health and Neurosciences (NIMHANS), Hosur Road, Bengaluru, Karnataka - 560 029, India.
E-mail: rohinigondhule@gmail.com

Submitted: 09-Apr-2021, **Accepted:** 11-Apr-2021, **Published:** 02-Sep-2021

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Access this article online

Website: www.saudija.org

DOI: 10.4103/sja.sja_259_21

Quick Response Code

How to cite this article: Surve RM, Bharadwaj S, Srinivas D, Anju JL. Pre-emptive diagnosis of cerebral ischemia during carotid endarterectomy with transcranial motor evoked potential monitoring under general anesthesia. Saudi J Anaesth 2021;15;471-3.