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# Transcranial Motor Evoked Potentials during Basilar Artery Aneurysm Surgery: Technique Application for 30 Consecutive Patients

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*Neurosurgery*, Volume 54, Issue 4, 1 April 2004, Pages 916–924,  
<https://doi.org/10.1227/01.NEU.0000114511.33035.AF>

**Published:** 01 April 2004    **Article history** ▼

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## Abstract

OBJECTIVE

Microsurgical clipping of basilar artery aneurysms carries a risk of neurological compromise resulting from midbrain or thalamic ischemia. Somatosensory evoked potential (SSEP) monitoring and electroencephalography are the standard techniques for assessing the level of cerebroprotective anesthesia and monitoring ischemia during temporary occlusion or after permanent clipping. Transcranial motor evoked potential (TcMEP) monitoring was added to determine whether this modality improved intraoperative monitoring.

## METHODS

Combined SSEP/electroencephalographic/TcMEP monitoring was used for 30 consecutive patients with basilar artery apex aneurysms in the past 1.5 years. Voltage thresholds were recorded before, during, and after aneurysm treatment for the last 10 patients.

## RESULTS

All 30 patients underwent an orbitozygomatic craniotomy for clipping (28 patients), wrapping (1 patient), or superficial temporal artery-superior cerebellar artery bypass (1 patient). Electrophysiological changes occurred for 10 patients (33%), elicited by temporary clipping (6 patients), permanent clipping (3 patients), or retraction (1 patient). Isolated SSEP changes were observed for one patient, isolated TcMEP changes for five patients, and changes in both TcMEPs and SSEPs for four patients. Among patients with simultaneous changes, TcMEP abnormalities were more robust and occurred earlier than SSEP abnormalities. Impaired motor conduction was detected first with an increase in the voltage threshold (from  $206 \pm 22$  to  $410 \pm 49$  V,  $P < 0.05$ ,  $n = 3$ ) and then with loss of TcMEP responses. SSEP and TcMEP signals returned to baseline values for all patients after corrective measures were taken.

## CONCLUSION

TcMEP monitoring can be safely and easily added to traditional neurophysiological monitoring during basilar artery aneurysm surgery. These results suggest that TcMEPs may be more sensitive than SSEPs to basilar artery and perforating artery ischemia. This additional intraoperative information might minimize the incidence of ischemic complications attributable to prolonged temporary occlusion or inadvertent perforator occlusion.

**Keywords:** [Aneurysm](#), [Basilar artery](#), [Motor evoked potential](#), [Neuromonitoring](#),

[Somatosensory evoked potential](#), [Subarachnoid hemorrhage](#)

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Online ISSN 1524-4040

Print ISSN 0148-396X

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