Sensitivity and Specificity of Intraoperative Neuromonitoring for Identifying Safety and Duration of Temporary Aneurysm Clipping Based on Vascular Territory, a Multimodal Strategy

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ABSTRACT:

Background

Patients who undergo clipping of cerebral aneurysms face an inherent risk for new postoperative neurologic deficits. Intraoperative neuromonitoring (IONM) is used often for early detection of ischemic changes, while it is still potentially reversible. However, the value, safety, and efficacy of temporary clipping and multimodal IONM to minimize risks are debated. Our retrospective series examined the sensitivity and specificity of IONM using transcranial motor evoked potentials and somatosensory evoked potentials and quantified the safety of temporary clipping by duration and vascular territory.

Methods

Our prospectively collected database (2010–2013) included 123 consecutive patients who underwent clipping of 133 cerebral aneurysms with use of IONM. We determined postoperative deficit rate and sensitivity and specificity of monitoring to predict these changes intraoperatively. The rate of permanent deficit after temporary clipping was correlated with duration, vascular territory, and IONM findings.

Results

Of 133 clipped aneurysms, 15 instances of IONM changes occurred, including 12 temporary without new postoperative deficit and 3 permanent with new postoperative deficit. Somatosensory evoked potential monitoring predicted one of the permanent deficits and transcranial motor evoked potentials predicted the other 2 deficits.

Conclusions

Multimodal IONM was highly specific and sensitive for detecting new deficits. Three patients with new deficits had temporary clipping, including 2 patients with IONM changes not temporally associated with clip placement. Our 1.1% rate of permanent neurologic deficit attributed to temporary clipping support its safety. Differences in patterns of IONM changes among vascular territories warrant further investigation.