Introduction

Intraoperative neuromonitoring: an essential component of the neurosurgical and spinal armamentarium

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THE goal of intraoperative monitoring (IOM) is to provide real-time or close to real-time feedback to the operative team to prevent or minimize injury to critical neural structures including the brain, spinal cord, cranial nerves, spinal nerve roots, and peripheral nerves.^{2–4,6–8,10–12,14} There is emerging evidence that IOM, particularly when used in a multimodality manner, sensitively detects intraoperative neurophysiological injury.¹³ This affords the operative team an enhanced opportunity to either prevent permanent neurological injury or at least to minimize the impact of injury to neural structures.¹

This issue of *Neurosurgical Focus* highlights advances in IOM technologies including the use of motor and somatosensory evoked potentials to assess the integrity of descending corticospinal and ascending somatosensory pathways, selective cortical and subcortical mapping to enable the resection of lesions from eloquent regions of the brain, electromyography to assess the integrity of cranial nerves or spinal nerve roots, various approaches including brainstem auditory evoked potentials and cochlear nerve action potentials to enhance the safety of vestibular schwannoma surgery, and novel techniques to assess intraoperative cerebral blood flow by using laser speckle contrast analysis. The results of an international survey are also presented in this special issue and highlight the growing perception among neurosurgeons that IOM is a valuable adjunct to the operative armamentarium. The impact of anesthesia on intraoperative neurophysiological recordings is also reviewed in this issue of *Neurosurgical Focus* and further highlights the importance of multidisciplinary teamwork in setting up a successful IOM program.

While the evidence that IOM improves outcomes is based largely on uncontrolled prospective or retrospective case series,^{5,6,13} these studies do provide consistent evidence that IOM is associated with enhanced outcomes in operative procedures in which eloquent neural structures are at risk. Indeed, based on a systematic review of the IOM literature related to spinal surgery, a consensus group organized by AOSpine North America has con-

cluded that multimodality neuromonitoring be strongly recommended in cases in which the spinal cord or nerve roots are deemed to be at risk.⁵

The use of IOM appears to be increasing in neurosurgery and spinal surgery, which reflects the growing acceptance of these methods by the clinical community and the increased ease of their application. Moreover, as neurophysiological and anesthetic techniques improve, it is likely that IOM will become a routine intraoperative adjunct and an essential part of the neurosurgical armamentarium. In the future, it is anticipated that IOM technologies will combine the use of real-time electrophysiological techniques, with measures of cerebral and spinal cord blood, functional imaging and intraoperative image guidance.⁹

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