AAN Summary of Evidence-based Guideline for CLINICIANS

UPDATE: INTRAOPERATIVE SPINAL MONITORING WITH SOMATOSENSORY AND TRANSCRANIAL ELECTRICAL MOTOR EVOKED POTENTIALS

This is a summary of the American Academy of Neurology (AAN) and American Clinical Neurophysiology Society guideline update regarding use of intraoperative spinal monitoring (IOM) with somatosensory evoked potentials (SEPs) and transcranial electrical (tce) motor evoked potentials (MEPs).

Please refer to the full guideline at* www.aan.com *for more information.

Does IOM with SEPs and tceMEPs predict adverse surgical outcomes?

Strong evidence	Surgeons and other members of the operating team should be alerted to the increased risk of severe adverse neurologic outcomes in patients with important IOM changes (**Level A**[†]).

Clinical context

In practice, after being alerted to IOM changes, the operating team intervenes to attempt to reduce the risk of adverse neurologic outcomes. No studies in humans have directly measured the efficacy of such interventions. However, multiple controlled studies in animals have demonstrated that intervening after IOM alerts (as opposed to not intervening) reduces the risk of permanent neurologic injury. On this basis, it seems reasonable to assume that such interventions might improve outcomes in humans as well. It is unlikely that controlled human studies designed to determine the efficacy of post-IOM alert interventions will ever be performed.

This analysis did not compare MEP with SEP. The two techniques differ slightly. MEP more directly monitors the motor pathway itself. One technique may change while the other remains stable, or one may change earlier than the other. MEP requires more restrictive anesthesia requirements, causes patient movement, and has less-clear criteria for raising an alarm. SEP can localize an injury or site of ischemia more exactly. The tceMEPs are often used intermittently because of movements that occur with the stimulus. Sometimes one technique can be accomplished throughout a case whereas the other technique cannot.

As a result, it may be most appropriate for the surgeon, anesthesiologist, and neurophysiologic monitoring team to choose which technique(s) are most appropriate for an individual patient. Conducting both techniques together is a reasonable choice for many patients. Neither technique can predict the onset of paraplegia that is delayed until hours or days after the end of surgery. Neither technique should be considered to have perfect predictive ability when no EP change is seen; rare false-negative monitoring has occurred.

The studies reported here varied somewhat in the criteria used to raise alerts. The specific criteria used are reported in table e1 of the published guideline.

These IOM studies involved a knowledgeable professional clinical neurophysiologist supervisor. These studies support performance of IOM when conducted under the supervision of a clinical neurophysiologist experienced with IOM. IOM conducted by technicians alone or by an automated device is not supported by the studies reported here because these studies did not use that practice model and because there is a lack of identified well-designed published outcomes studies demonstrating efficacy with those practice models.

Based on an AAN guideline endorsed by the American Association of Neuromuscular and Electrodiagnostic Medicine

This is an educational service of the American Academy of Neurology. It is designed to provide members with evidence-based guideline recommendations to assist the decision making in patient care. It is based on an assessment of current scientific and clinical information and is not intended to exclude any reasonable alternative methodologies. The AAN recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, and are based on the circumstances involved. Physicians are encouraged to carefully review the full AAN guidelines so they understand all recommendations associated with care of these patients.

†**Classification of Recommendations: A** = Established as effective, ineffective, or harmful (or established as useful/predictive or not useful/predictive) for the given condition in the specified population. (Level A rating requires at least two consistent Class I studies.)* **B** = Probably effective, ineffective, or harmful (or probably useful/predictive or not useful/predictive) for the given condition in the specified population. (Level B rating requires at least one Class I study or two consistent Class II studies.) **C** = Possibly effective, ineffective, or harmful (or possibly useful/predictive or not useful/predictive) for the given condition in the specified population. (Level C rating requires at least one Class II study or two consistent Class III studies.) **U** = Data inadequate or conflicting; given current knowledge, treatment (test, predictor) is unproven.

*In exceptional cases, one convincing Class I study may suffice for an "A" recommendation if 1) all criteria are met, 2) the magnitude of effect is large (relative rate improved outcome >5 and the lower limit of the confidence interval is >2).

Classification of Evidence for Diagnostic Accuracy

Class I = A cohort study with prospective data collection of a broad spectrum of persons with the suspected condition, using an acceptable reference standard for case definition. The diagnostic test is objective or performed and interpreted without knowledge of the patient's clinical status. Study results allow calculation of measures of diagnostic accuracy.

Class II = A case control study of a broad spectrum of persons with the condition established by an acceptable reference standard compared to a broad spectrum of controls or a cohort study where a broad spectrum of persons with the suspected condition where the data was collected retrospectively. The diagnostic test is objective or performed and interpreted without knowledge of disease status. Study results allow calculation of measures of diagnostic accuracy.

Class III = A case control study or cohort study where either persons with the condition or controls are of a narrow spectrum. The condition is established by an acceptable reference standard. The reference standard and diagnostic test are objective or performed and interpreted by different observers. Study results allow calculation of measures of diagnostic accuracy.

Class IV = Studies not meeting Class I, II or III criteria, including consensus, expert opinion, or a case report.

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