Medical Coverage Policy | Intraoperative Neurophysiologic Monitoring

EFFECTIVE DATE: 11|15|2011
POLICY LAST UPDATED: 10|20|2015

OVERVIEW

This medical policy documents the coverage determination for intraoperative neurophysiologic monitoring (IONM). Intraoperative neurophysiologic monitoring describes a variety of procedures that have been used to monitor the integrity of neural pathways during high-risk neurosurgical, orthopedic, and vascular surgeries.

This policy refers only to use of these techniques as part of intraoperative monitoring. Other clinical applications of these techniques, such as visual-evoked potentials and EMG, are not considered in this policy.

MEDICAL CRITERIA

Not applicable

PRIOR AUTHORIZATION

Not applicable

POLICY STATEMENT

BlueCHiP for Medicare and Commercial Products

- Intraoperative monitoring, which includes somatosensory-evoked potentials, motor-evoked potentials using trans-cranial electrical stimulation, brainstem auditory- evoked potentials, EMG of cranial nerves, EEG, and electrocorticography (ECoG), may be considered **medically necessary** during spinal, intracranial, or vascular procedures.

- Intraoperative monitoring of visual-evoked potentials is considered **not medically necessary** due to lack of peer-reviewed medical literature that supports efficacy**.**

- Intraoperative EMG and nerve conduction velocity monitoring during surgery on the peripheral nerves is considered **not medically necessary** due to lack of peer-reviewed medical literature that supports efficacy**.**

- Due to the lack of U.S Food and Drug Administration (FDA) approval, intraoperative monitoring of motor-evoked potentials using devices for trans-cranial magnetic stimulation is considered **investigational** and is thus a contract exclusion.

COVERAGE

Benefits may vary between groups/contracts. Please refer to the appropriate Benefit Booklet, Evidence of Coverage, or Subscriber Agreement for applicable surgery/not medically necessary coverage/benefits.

BACKGROUND

Intraoperative neurophysiologic monitoring (IONM) describes a variety of procedures that have been used to monitor the integrity of neural pathways during high-risk neurosurgical, orthopedic, and vascular surgeries. It involves the detection of electrical signals produced by the nervous system in response to sensory or electrical stimulus to provide information about the functional integrity of neuronal structures.

The principal goal of IONM is the identification of nervous system impairment in the hope that prompt intervention will prevent permanent deficits. Correctable factors at surgery include circulatory disturbance,

excess compression from retraction, bony structures, or hematomas, or mechanical stretching. The technology is continuously evolving with refinements in equipment and analytic techniques, including recording, with several patients monitored under the supervision of a physician who is outside the operating room.

The different methodologies of monitoring are described below:

Sensory-evoked Potentials

Sensory-evoked potential (SEP) describes the responses of the sensory pathways to sensory or electrical stimuli. Intraoperative monitoring of SEPs is used to assess the functional integrity of central nervous system (CNS) pathways during operations that put the spinal cord or brain at risk for significant ischemia or traumatic injury. The basic principles of SEP monitoring involve identification of a neurological region at risk, selection and stimulation of a nerve that carries a signal through the at risk region, and recording and interpretation of the signal at certain standardized points along the pathway. Monitoring of SEPs is commonly used during the following procedures: carotid endarterectomy, brain surgery involving vasculature, surgery with distraction compression or ischemia of the spinal cord and brainstem, and acoustic neuroma surgery. Sensory-evoked potentials can be further broken down into the following categories according to the type of simulation used:

- Somatosensory-evoked potentials (SSEPs) are cortical responses elicited by peripheral nerve stimulations. Peripheral nerves, such as the median, ulnar, or tibial nerves are typically stimulated, but in some situations the spinal cord may be stimulated directly. Recording is done either cortically or at the level of the spinal cord above the surgical procedure. Intraoperative monitoring of SSEPs is most commonly used during orthopedic or neurologic surgery to prompt intervention to reduce surgically induced morbidity and/or to monitor the level of anesthesia. One of the most common indications for SSEP monitoring is in patients undergoing corrective surgery for scoliosis. In this setting, SSEP monitors the status of the posterior column pathways and thus does not reflect ischemia in the anterior (motor) pathways. Several different techniques are commonly used, including stimulation of a relevant peripheral nerve with monitoring from the scalp, from interspinous ligament needle electrodes, or from catheter electrodes in the epidural space.
- Brainstem auditory-evoked potentials (BAEPs) are generated in response to auditory clicks and can define the functional status of the auditory nerve. Surgical resection of a cerebellopontine angle tumor, such as an acoustic neuroma, places the auditory nerves at risk, and BAEPs have been extensively used to monitor auditory function during these procedures.
- Visual-evoked potentials (VEPs) with light flashes are used to track visual signals from the retina to the occipital cortex. VEP monitoring has been used for surgery on lesions near the optic chiasm. However, VEPs are very difficult to interpret due to their sensitivity to anesthesia, temperature, and blood pressure.

EMG (Electromyogram) Monitoring and Nerve Conduction Velocity Measurements

- Electromyogram monitoring and nerve conduction velocity measurements can be performed in the operating room and may be used to assess the status of the peripheral nerves, (e.g., to identify the extent of nerve damage prior to nerve grafting or during resection of tumors). In addition, these techniques may be used during procedures around the nerve roots and around peripheral nerves to assess the presence of excessive traction or other impairment. Surgery in the region of cranial nerves can be monitored by electrically stimulating the proximal (brain) end of the nerve and recording via EMG in the facial or neck muscles. Thus monitoring is done in the direction opposite that of sensory-evoked potentials, but the purpose is similar—to verify that the neural pathway is intact.

Motor-Evoked Potential Monitoring

Motor-evoked potentials (MEPs) are recorded from muscles following direct or transcranial electrical stimulation of motor cortex or by pulsed magnetic stimulation provided by a coil placed over the head. Peripheral motor responses (muscle activity) are recorded by electrodes placed on the skin at prescribed points along the motor pathways. MEPs especially when induced by magnetic stimulation can be affected by anesthesia. The Digitimer electrical cortical stimulator received FDA premarket approval in 2002. Devices for trans-cranial magnetic stimulation have not yet received approval from the FDA for this use.

Multimodal IONM, in which more than one technique is used, most commonly with SSEPs and MEPs, has also been described.

EEG (Electroencephalogram) Monitoring
Spontaneous EEG monitoring can also be recorded during surgery and can be subdivided as follows:

- EEG monitoring has been widely used to monitor cerebral ischemia secondary to carotid cross clamping during a carotid endarterectomy. EEG monitoring may identify those patients who would benefit from the use of a vascular shunt during the procedure to restore adequate cerebral perfusion. Conversely, shunts, which have an associated risk of iatrogenic complications, may be avoided in those patients in whom the EEG is normal. Carotid endarterectomy may be done with the patient under local anesthesia so that monitoring of cortical function can be directly assessed.
- Electrocorticography (ECoG) is the recording of the EEG directly from a surgically exposed cerebral cortex. CoG is typically used to define the sensory cortex and to map the critical limits of a surgical resection. ECoG recordings have been most frequently used to identify epileptogenic regions for resection. In these applications, ECoG does not constitute monitoring, per se.

CODING

BlueCHiP for Medicare and Commercial Products
NOTE: This policy refers only to use of these techniques as part of **intraoperative monitoring**. Other clinical applications of these techniques, such as visual-evoked potentials and EMG, are not considered in this policy.

Coverage for the following CPT and HCPCS codes related to visual evoked potentials, EMG, and nerve conduction velocity studies when used as part of intraoperative monitoring is made according to the conditions cited in the policy statement:

92585 95829 95867 95868 95907 95908 95909 95910 95911
95912 95913 95925 95926 95927 95930 95940 95941 (Use alternate code: G0453)
95955 G0453

RELATED POLICIES

None

PUBLISHED

Provider Update, December 2015
Provider Update, July 2014
Provider Update, May 2013
Provider Update, July 2012

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