Intraoperative neurophysiological monitoring for Lumbar Spinal Instrumentation

see also Intraoperative Neurophysiological Monitoring in Spine Surgery.

Multimodal intraoperative neurophysiologic monitoring (IONM) can be utilized as an adjunct to lumbar spinal instrumentation in order to aid with avoidance of neurologic complications. The most commonly utilized modalities include Somatosensory evoked potentials,motor evoked potentials, and electromyography. Somatosensory-evoked potentials (SSEPs) allow for continuous assessment of the dorsal columns of the spinal cord and are therefore most useful during procedures with a posterior approach to the cervical and thoracic spine. Motor-evoked potentials (MEPs) and electromyography (EMG) can be applied intermittently to assess motor nerve function. The utility of each individual modality can be largely dependent on the surgical approach. Approaches to lumbar spinal instrumentation can be generally categorized as anterior, lateral, and posterior. For lateral approaches, electromyography can be helpful in identifying neural structures crossing the surgical field to prevent injury. In posterior and anterior approaches, somatosensory-evoked potentials and motor-evoked potentials can be used to assess nerve injury during and after maneuvers for decompression and instrumentation. Additionally, during the placement of pedicle screws, direct stimulation with triggered electromyography can be used to detect the pedicle cortex's breach. The efficacy of intraoperative neuromonitoring is dependent on prompt and accurate recognition of changes in signals. This is then followed by accurate recognition of the cause for these changes and appropriate responses by the surgeon, anesthesiologist, and monitoring personnel to correct the change [1)]

Although IONM is commonly used during spinal deformity in the modern era, its use in degenerative lumbar surgery, especially in uncomplicated procedures, remains controversial [2)].

Supporters of IONM point out its value in detecting spinal nerve root injuries with high sensitivity and specificity, especially in revision and instrumented fusions cases [3)].

Although numerous studies have supported the use of IONM in lumbar fusion surgery, it is still unclear whether the improved detection of crisis events intraoperatively translates to a decreased rate of postoperative neurological deficits [4)].

1)
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