체성감각유발전위를 이용한 수술중신경계감시: 검사 방법 및 해석 기준



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Somatosensory evoked potential monitoring: Technique and criteria

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Instructional objectives:

After attending this lecture, the participants should be able to:

- 1. Describe the roles of intraoperative somatosensory evoke potentials (SEP)
- 2. SEP Techniques (stimulation, recording, peaks, generators and baseline values) and Interpretation of changes, alarms and consideration.

3. State the warning criteria

Somatosensory evoked potential intraoperative monitoring of the lower extremities use stimulation at the ankles over the posterior tibial nerve with recording over the neck and scalp. Similarly, SEP IOM of the upper extremities usually uses stimulation of the median nerve at the wrists with recording over neck and scalp. Sometimes the ulnar nerve is used instead. Theses types of monitoring provides an assessment of the peripheral conduction, spinal cord posterior column, brainstem medial lemniscus, and hemisphere lemniscal sensory pathway.

The goal is to provide an early warning of complications, thereby allowing the surgeon the opportunity to intervene and correct the problem if possible. A second goal is to provide reassurance that no notable complication has occurred so far, thereby allowing the surgeon to provide additional degrees of a procedure.

Ankle or wrist to scalp and neck SEP monitoring techniques are similar to SEPs commonly found in the outpatient test. However, in the operation room where high signal-to-noise (SNR) and short averaging time are critical for effective monitoring, they are suboptimal because nearly all of them turned out to have low SNRs. This has led to the development of SEP optimization and maximize SNR. Traditional warning criteria were empirically set in the 1070's as a >50% amplitude reduction or >10% latency prolongation compared to baseline. However, they are somewhat illogical. Latency prolongation with amplitude preservation is the hallmark of demyelination. The acute malfunctions that arise during surgery consist of neuronal or axonal failure that reduced SEP amplitude. There may or may not be some latency prolongation, but amplitude is the primary consideration. The warning criterion is a visually obvious amplitude decrement compared to a recent pre-change reference SEP.

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