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SENTIENT Medical Systems

Intraoperative Monitoring and Diagnostic Services

Neuromonitoring Can Decrease Scoliosis Surgery Complication Rate

Scoliosis surgery presents a risk to a patient. Multi-modality intraoperative monitoring using somatosensory and motor evoked potentials provides a significant layer of protection during deformity surgery. The article below presents a method which provides rapid and safe protection of spinal sensory and motor pathways.

Monitoring scoliosis surgery with combined multiple pulse transcranial electric motor and cortical somatosensory-evoked potentials from the lower and upper extremities. MacDonald, et al. Spine 2003 Jan 15; 28(2):194-203.

OBJECTIVE: To assess the value, rapidity, and safety of combined multiple-pulse transcranial electric stimulation motor-evoked potential and somatosensory-evoked potential monitoring during scoliosis surgery.
SUMMARY OF BACKGROUND DATA: Leg somatosensory-evoked potentials can miss motor deficits, and a 50% amplitude warning criterion can produce false alarms.
METHODS: For this study, 33 scoliosis surgeries in neurologically normal patients under propofol/fentanyl anesthesia omitting neuromuscular blockade were monitored with four-extremity multiple-pulse transcranial electric stimulation muscle motor-evoked potentials and cortical somatosensory-evoked potentials. Instead of amplitude criteria, parallel (same-direction) change was used to identify systemic alteration and nonparallel (one- or two-limb) deterioration to identify focal neurologic compromise. Clinical observation and intraoperative electroencephalography were used to assess adverse effects.
RESULTS: Instantaneous motor-evoked potentials and rapidly reproducible cortical somatosensory-evoked potentials provided comprehensive feedback every 0.8 to 6.7 minutes (median, 2.4 minutes) without adverse effects. Parallel (systemic) changes without alarm or deficit included motor-evoked potential fading or temporary loss and leg somatosensory-evoked potential amplitudes below 50% of initial, maximum, or median intraoperative values in 10% to 37% of the cases. Three nonparallel changes occurred:

1) abrupt bilateral leg somatosensory-evoked potential 20% to 30% reduction without motor-evoked potential change during instrumentation resolving spontaneously over 30 minutes, with transient postoperative sensory symptoms;
2) right-arm somatosensory-evoked potential and motor-evoked potential reduction during hyperabduction restored after repositioning, without deficit;
3) abrupt bilateral leg motor-evoked potential loss preceding 30% to 60% somatosensory-evoked potential reduction during derotation rapidly restored after instrumentation release, without deficit.

CONCLUSIONS: In neurologically normal patients, the combined methods are safe and rapid, and could improve the sensitivity and specificity of scoliosis monitoring. Arm controls facilitate differentiation between systemic alterations and focal neurologic compromise.

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