Critical intraoperative neurophysiologic monitoring change during surgical exposure in pediatric thoracic scoliosis

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Background
When to begin and end intraoperative neurophysiologic monitoring (IONM) is not well established. IONM can start immediately after baseline evoked potentials are obtained, before positioning, after positioning, or after surgical exposure. Examples where IONM changes occur at times other than the critical portion of the surgery demonstrate the value of IONM even when neural injury is not anticipated. One such case is presented here.

Case Description
A 15-year-old with atypical scoliosis (3D reconstruction above) and normal neurologic function was prepared for surgical correction. Baseline four limb somatosensory evoked potentials (SEP's) and motor evoked potentials (MEP's) were well defined and remained so after prone positioning. After surgical exposure of T5 to T10 spinal processes, bilateral lower limb SEP's and MEP's disappeared while remaining stable in the upper limbs. No spinal manipulation or deformity correction had occurred. Spinal stimulated MEP's were present from T12 to T7 but not more cephalad. A wake-up test was equivocal prompting an emergent MRI (images shown).

IONM Summary (first surgery – exposure only)

Post IONM Alert MRI

MEP Summary (second surgery)

Discussion
No formal guidelines exist on when IONM should begin and end for specific surgical populations. Positioning is a well documented source of neural injury, especially spinal cord, before surgery even starts. The immediate loss of lower limb SEP's and MEP's upon prone positioning during the second surgery of the patient presented here is more typical of changes seen in our practice. Surgical exposure is not typically considered a time when spinal cord is at risk of injury. In the first surgery of the case presented here, dissecting soft tissue was suspected to have reduced some of the spinal curvature as a result of gravity. Bilateral lower limb changes in both surgeries were accurate predictors of the neurologic deficits which developed after surgery. Our current practice is now to monitor during surgical exposure.

MRI showed complete effacement of the thecal sac with abundant epidural fat and subtle cord T2 hyperintensity. The patient demonstrated mild paraparesis approximately 9 hours later and was observed for two days prior to returning to the operating room.