Hourly 'Wake-up tests' for Severe Idiopathic Scoliosis: An Anesthetic Challenge

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Introduction

Posterior spinal fusion is a common procedure for adolescent idiopathic scoliosis. Intraoperative monitoring methods are used for early recognition of neurological complications. Neuromonitoring obviates the need for a wake up test, until evoked potentials are lost. Due to the inherent risks in waking up a prone patient during major surgery, this test is not commonly used.

Case

Background

We describe a case of a 17-year-old female with a history of severe scoliosis T4-T10 (133 degree), T11-L4 (83 degree). She presented to the emergency room with a chief complaint of back pain and leg numbness. Patient was found to have severe restrictive defect in her lungs secondary to her scoliosis and was severely malnourished weighing only 28.7 kg. She was admitted to the hospital for one month of halo traction and weight gain, prior to scheduled spinal fusion.

In the first two spinal fusion attempts, somatosensory evoked potentials (SSEPs) and motor evoked potentials (MEPs) were lost soon after surgery start time. In the second attempt, the patient was unable to move her lower extremities with a wake up test, with return of function within 24 hours. The procedure was aborted both times.

Case (cont.)

In the third attempt the patient received an intravenous induction of general anesthesia with the anesthetic unchanged from her two previous surgeries. Special care was taken to ensure the patient's prone positioning did not effect her neuromonitoring signals or her ventilation. Her legs were placed in a sling on the Jackson table to decrease the extension of the hip and to place her into a more natural fetal position. This was not done in the previous two attempts.

Thirty minutes into the procedure signals were lost and the first wake up test was performed. The patient received dexamethasone and lidocaine boluses, and the surgeon removed the previously placed screws. The patient was able to move all four extremities to command; signals improved to baseline and the surgery proceeded.

Case (cont.)

Two hours later, signals were lost again during rod placement and another wake up test was performed. The patient moved all four extremities with signals improving back to baseline. Packed red blood cells were given to increase patient hematocrit and phenylephrine infusion was increased to maintain the mean arterial pressure (MAP) above 90.

The procedure proceeded with the surgery and anesthesia teams immediately addressing any small change in the SSEP and MEP data. The patient was extubated and moved all four extremities to command prior to leaving the operating room. She had an uneventful recovery with no recall of her multiple wake-up tests.

Discussion

Loss of signals during neuromonitoring is not uncommon. The percent of spine cases with changes in signals that necessitated intervention, ranged from 1.5% to 21% in different studies. These studies agree that most signal changes are false-positives with a normal wake-up test and are usually due to lability in the mean arterial pressure or vascular etiology. In cases with true injury, the neuromonitoring enabled the practitioners to intervene early, and most patients had a full recovery within 18 months.

In this case, vascular insufficiency was suspected as the cause, with relatively prompt return of signals with changes in positioning, correction of distraction forces, and improvement in blood volume and MAP.

In a high-risk spinal fusion patient, close attention to detail is imperative to minimize risk of iatrogenic spinal cord injury. Careful positioning of the patient to minimize any compromise of the spinal cord, close titration of anesthetic, and constant discussion between the anesthesiologist, surgeon, and neurophysiologist is essential in ensuring a successful spinal fusion.

References

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