EARLY DETECTION OF PEDICLE SCREW RELATED SPINAL CORD INJURY BY INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING (IONM)

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OBJECTIVE

This case report illustrates the benefit of utilizing intra-operative neurophysiological monitoring (IONM) with continuous somatosensory-evoked potentials (SSEP), and transcranial motor evoked potentials (TCeMEP) during pedicle screw placement in scoliosis correction surgery.

INTRODUCTION

Pedicle screw placement has a high risk of damaging the motor and sensory pathways due to its close proximity to the spinal cord. An early detection and prevention of injury can be achieved by utilizing Somatosensory Evoked Potentials (SSEP) and Trans Cranial electrical Motor Evoked Potentials (TCeMEP) during a scoliosis surgery.

CASE REPORT

A 19-year-old female with scoliosis was presented for surgery. After intubation, electrodes were placed for ulcer in upper and posterior tibial nerve SSEPs in lower extremities. Electrodes for EMG and TCeMEP were placed in thenar-hypotenar, quadriceps, gastrocnemius, tibialis anterior, adductor hallucis and extensor hallucis brevis muscles. Total intravenous anesthesia was used with propofol 200 mcg/kg/min and remifentanil at 0.5 mcg/kg/min. Inomed ISIS IOM Neuromonitoring machine (Inomed Medizintechnik GmbH, Emmendingen, Germany) was used for IONM during this surgery. Baseline SSEP and TCeMEP responses were present in all limbs.

Four pedicle screws were placed on left side of T6, T9, T12 and L1 followed by placement of four screws on the right side of the same spinal levels. After placing the last screw at right L1, surgeon was immediately informed of loss of TCeMEP signals bilaterally in lower extremities. Surgery was paused. TCeMEP responses returned to baseline in left lower limb except flap foot but remained absent in right lower limb. All screws were removed on right side with no improvement. A wake-up test was performed which was negative in her right leg. Later, left side screws were also removed. Blood pressure was increased from MAP of 90 to 95 mmHg. An 8.0 mg of I.V. dexamethasone was given intraoperatively. There was no improvement in right lower limb TCeMEP responses. Then, 400 mg of hydrocortisone was given post-operatively.

Surgeon was advised to stop the surgery and proceed for MRI and follow-up. SSEP signals remained stable in all four extremities. The surgical correction was cancelled.

CONCLUSIONS

Real-time IONM was useful in early identification of spinal cord injury. Significant changes were seen in TCeMEP, without any change in SSEP. We highly recommend utilizing continuous TCeMEP and SSEP monitoring during pedicle screw placement for prevention of injury to the spinal cord. In this case, patient would have been paralyzed post-operatively without the use of IONM.