Anesthesia Management for Electrophysiological Neuromonitoring in a Patient of a Spinal Tumor Excision at Lumbar Level: A Case Report

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Abstract
This is a case report of a 40-year-old ASA1 patient posted for intradural extramedullary tumor at the level of the L2–L3 spine. The patient was operated for the same and the tumor was resected. Postoperatively after 36 hours, the patient complained of loss of bladder sensation associated with urinary retention. Surgical, urological, and radiological findings were suggestive of the mass effect (remnant tumor or clot) at the site of the previous surgery. A decision was taken to perform a re-exploration at the site with the use of electrophysiological monitoring including somatosensory evoked potential (SSEP) and motor-evoked potential (MEP). The surgery was performed completely under total intravenous sedation with the use of midazolam, fentanyl, and propofol. The remnant mass was resected and the patient regained sensory functions in the postoperative period. Hence, this case report highlights the use of total intravenous sedation for somatosensory and motor-evoked potential monitoring in major neurosurgeries.

Keywords: Somatosensory and motor-evoked potential, Spinal tumor, Total intravenous anesthesia.

Introduction and Case History
This is a case report of a 40-year-old ASA1 patient posted for intradural extramedullary tumor at the level of the L2–L3 spine. The patient was operated for the same and the tumor was resected. Postoperatively after 36 hours, the patient complained of loss of bladder sensation associated with urinary retention. Surgical, urological, and radiological findings were suggestive of the mass effect (remnant tumor or clot) at the site of the previous surgery. A decision was taken to perform a re-exploration at the site with the use of electrophysiological monitoring including somatosensory and motor-evoked potential. The surgery was performed completely under total intravenous sedation with the use of midazolam, fentanyl, and propofol. The remnant mass was resected and the patient regained sensory functions in the postoperative period. Hence, this case report highlights the use of total intravenous sedation for somatosensory and motor-evoked potential monitoring in major neurosurgeries (Fig. 1).

General Examination
All vitals stable. No pallor, edema, icterus, lymphadenopathy.

Systemic Examination
RS: Ae Be clear and equal
CVS: S1 S2 heard, no murmur
P/A: soft, nontender
CNS: patient conscious, cooperative, oriented to time, place, and person

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Spine:
Inspection: no deformities, no visible swelling or deformity, skin normal, no sinuses or fistula
Palpation: all inspectory findings confirmed on palpation. No local rise in temperature, no tenderness
LL power: (Table 1)

|   | Right | Left |
|---|-------|------|
| Hip | 5/5   | 5/5  |
| Knee | 5/5   | 5/5  |
| Ankle | 5/5 | 5/5 |

Sensation over left L5–S1 area decreased, while right side was normal.
Loss of sensation of micturition.

Investigations
All routine investigations were within normal limits.

Preanesthetic Check-up
Airway: Mouth opening was adequate. MPC 2, normal neck movements, no loose teeth. The patient was an easy intubation. ASA grade I.

Plan of Anesthesia
The patient was taken in the operating room, all monitors attached.
Antibiotics were given preoperatively to the patient.
The patient was premedicated with glycopyrrolate, midazolam, and fentanyl and intubated successfully using an 8 number flexo-metallic portex tube, under the effect of succinylcholine (Fig. 2).
A long-acting muscle relaxant (vecuronium) was given to the patient while the patient was turned to the prone position and the neuromonitoring electrodes were attached. The patient was maintained on 0.2% sevoflurane, oxygen, and air (Fig. 3).
After the effect of the muscle relaxant wore out, inhalational anesthetic gases were stopped and the patient was left on 100% oxygen. A baseline reading of the neuromonitoring was taken after which the incision was taken over the previous suture line and the surgery progressed (Fig. 4).

Fig. 2: Example of placement of electrodes for SSEP monitoring for neurosurgery

The patient was kept sedated under the effect of continuous propofol infusion started at 35 mL/hour for 5 minutes and then reduced to 5 mL/hour as a maintenance dose. An intermittent infusion of injection nitroglycerine was also started to keep the blood pressures under control. Pain management was done using injection fentanyl as and when necessary. No muscle relaxant was given to the patient throughout the procedure.
The pultaceous material was removed from the conus medullaris. Terminal lipoma at filum terminale was clipped and cut after confirmation using electrophysiological monitoring.
Once the surgery was completed, the patient was extubated successfully and shifted to the ICU. Vitals were stable.

Discussion
Intraoperative neurophysiological monitoring is a technique that is helpful for assessing the nervous system during spine surgery. It includes somatosensory and transcranial motor-evoked potential. Intraoperative neuromonitoring has high utility when the risk of injury is high but may be only marginally helpful when the risk of injury is low. Coordination of the monitoring team and the surgeon with the anesthetist forms an essential component for the success of the procedure. The activities of the monitoring team must integrate well with those of the surgical team and the anesthesia team, and should involve joint quality assessment and quality improvement activities.
Intraoperative neuromonitoring replaces the neurologic examination when the patient is under general anesthesia. It allows for assessment of many neural structures including the neuromuscular junction, peripheral nerve, brainstem, spinal cord, and cortex during surgery. Hence, it is the responsibility of the anesthetist to make use of drugs that do not interfere with the procedure as well as prevent patient discomfort.

Applications
(1) Detecting intraoperative spinal cord injury, (2) intraoperative monitoring for peripheral nerve injury, and (3) detecting spinal cord tumors or space-occupying lesions.

Conclusion
The use of neuro-navigation with anesthetic techniques with fully awake patients is the best alternative in the approach of patients
with neurological tumors allowing safe margins for tumor resection and reducing subsequent neurological sequelae. Maintenance of sedation in these supra-major cases is a major challenge to the anesthetist.

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