

Perioperative management and anesthetic considerations in a patient with post-polio syndrome undergoing general anesthesia: a case report



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Introduction

Poliomyelitis is a viral disease that attacks the motor neurons of the anterior horn of the spinal cord. A common sequela of poliomyelitis is its characteristic residual asymmetric motor deficit of the extremities.

Administering anesthesia presents special difficulties for individuals with polio-related weakness, especially with regards to postoperative recovery, respiratory function, and muscular relaxation. Furthermore, lingering neuromuscular impairments can be more sensitive to typical muscle relaxant dosages.

We provide a case that illustrates the special anesthetic concerns for a patient with residual upper extremity paralysis from a previous poliovirus infection undergoing minimally invasive transforaminal lumbar interbody fusion (MIS TLIF).

Patient Presentation

The patient is a 61-year-old female with a past medical history that includes hypertension, non-obstructive coronary artery disease, right bundle branch block, lumbar spinal stenosis, and post-poliomyelitis syndrome. She was diagnosed with polio during infancy and currently has weakness in her RUE and mild weakness in her RLE (4/5 on physical exam). She initially presented to the spine clinic with aching lower back pain radiating to her right thigh and lower leg. MRI of the lumbar spine demonstrated grade 1 spondylolisthesis at L4-5 with severe foraminal and central/lateral recess stenosis.

Preoperative labs were unremarkable, and she underwent L4-L5 transforaminal lumbar interbody fusion and instrumentation.

On the day of surgery, the patient presented with a blood pressure of 107/73 mmHg, SpO2 of 97%, a heart rate of 74, and was 64.4 kg.

Anesthetic Course

The patient was induced with 100 mcg fentanyl, 60 mg lidocaine 2%, 50 mg propofol, and 150 mcg remifentanil and successfully intubated with a Mac 3 blade and a 6.5 mm endotracheal tube with a Cormack Lehane grade IIa view. She was immediately started on infusions of 100 mcg/kg/min of propofol and 0.1 mcg/kg/min of remifentanil and a 50 mcg/min infusion of phenylephrine. Total intravenous anesthesia was maintained with 50-80 mcg/kg/min of propofol and 0.1-0.125 mcg/kg/min of remifentanil to facilitate neuromonitoring.

In addition to standard intraoperative monitoring, frontal EEG (Sedline, Massimo) was utilized during the case to ensure adequate depth of anesthesia during induction, avoid burst suppression and awareness during maintenance, and ensure timely emergence after cessation of propofol.

The case proceeded uneventfully with blood pressure being supported with 25-50 mcg/min of phenylephrine. Intraoperative analgesia included 200 mcg fentanyl, 2 mg hydromorphone, and 1 g acetaminophen. She was successfully extubated 10 minutes after discontinuation of propofol and taken to PACU and was subsequently admitted. She was discharged from the hospital 1 week later.

Discussion

Post-polio syndrome is a disease characterized by new onset weakness in muscles either previously affected or unaffected by acute poliomyelitis [4]. The pathophysiology of the disease is poorly understood but it is likely thought to be multifactorial. Acute polio infection causes a loss of motor neurons, and the remaining motor neurons develop collateral fibers to reinforce the denervated neurons. These new neurons are larger and fewer than those of a person unaffected by polio and are therefore more affected by normal loss of motor neuron function through aging. Given the deleterious effects of standard doses of anesthetics in patients within this population, it is pertinent for clinicians to explore different modalities to provide adequate treatment.

The utilization of frontal EEG allowed for guidance to minimize the propofol dose and avoid burst suppression commonly seen on induction of general anesthesia. Remifentanil was used for induction in place of a depolarizing paralytic and allowed for successful tracheal intubation. The remifentanil induction dose was also decreased from the commonly recommended 2.0-4.0 mcg/kg dose to create similar intubation conditions as with succinylcholine [6].

Continuous frontal EEG provided insight into establishing a baseline hypnotic dose of propofol consistent with the alpha-delta pattern of raw EEG and density spectrum array to guide analgesia to a depth appropriate for surgical stimulation. Even flipping patients into the prone position can cause excessive stimulation that is generally recognized as “too light” and treated with escalation of hypnotic agent and unnecessary overdosing with propofol. The current case showed that EEG guided TIVA was able to minimize anesthetic dosages while addressing nociception induced lightening of EEG signatures with opioids.

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