An unusual cause of delayed recovery from anesthesia

Sir,

It is well documented that chronic administration of anticonvulsants shortens the neuromuscular (NM) blockade recovery time.[1,2] There is, however, limited literature available on the acute administration of anticonvulsants, which in fact has an opposite effect on NM blockade.[3] We report a case of delayed NM recovery that, in all likelihood, was related to acute administration of phenytoin.

A 40-kg, 162-cm, 27-year-old man was scheduled for ileostomy closure under general anesthesia. Patient had sustained blunt trauma abdomen and underwent emergency exploratory laparotomy with resection and ileostomy 3 months earlier. Patient had a 2-year history of generalized tonic-clonic seizures, with the last episode 6 months back, but was not taking any antiepileptic medication. Recent computed tomography head revealed no significant findings. The hemogram, coagulation profile, renal function tests, and liver function tests were within normal limits. The total protein was 7.2 gm% and albumin 3.5 gm%. Patient had stable vital parameters. Monitoring included electrocardiography, non-invasive blood pressure, pulse oximetry, capnography, and nasopharyngeal temperature. Neuromuscular transmission (NMT) was monitored using Innervator 252 (Fisher and Paykel Healthcare Ltd., Auckland, New Zealand). After preoxygenation, anesthesia was induced with 80 mcg fentanyl and 80 mg propofol intravenous (IV). Forty milligrams of rocuronium was administered IV for NM blockade, and after tracheal intubation, lungs were mechanically ventilated to maintain end-tidal carbon dioxide between 30 and 35 mm Hg. Anesthesia was maintained with nitrous oxide (65%) in oxygen and end-tidal isoflurane (1%). After induction, loading dose of phenytoin 20 mg/kg (800 mg) was administered IV slowly in 100 ml of normal saline. Normothermia was maintained using a convective air warmer. Intraoperative vitals remained

within normal limits. The surgery lasted for 2 h and 15 min. Patient received 1.5 l crystalloids and voided 150 ml urine. The patient, however, recovered from the loading dose of NM blocker after 3½ h, as confirmed by NMT monitoring. Arterial blood gas analysis done at the end of surgery showed euglycemia and normal electrolytes.

Delayed emergence from anesthesia is always feared by all the anesthesiologists. It can be due to physiological causes (hypoglycemia, hyperglycemia, dyselectrolytemia, hypothermia, cerebral hypoxia, intracerebral event) or pharmacological causes (opioid/benzodiazepine over dosage, central nervous system depressants, residual NM blockade).[4] Opioid overdosage was ruled out by the absence of pinpoint pupil and confirmed by NMT indicating persisting NM blockade. We used a standard dose of fentanyl (3–5 mcg/ kg) and that should not have led to opioid overdosage. Patients with low serum pseudocholinesterase level or atypical pseudocholinesterase can have a prolonged recovery phase. However, depolarizing muscle relaxant drug (succinylcholine) was not administered to this patient. In this case, delayed recovery was possibly due to a combination of factors such as low body weight, chronic gastrointestinal tract dysfunction due to ileostomy, low normal albumin, and acute phenytoin administration.

Chronic phenytoin therapy accelerates recovery from non-depolarizing NM blockade due to amino steroid NM blockers, but not due to ester benzylisoquinoline NM blockers. Only a few studies illustrate pharmacokinetic and pharmacodynamics causes for such an NM resistance.[5] Acute phenytoin therapy decreases the stimulus-induced release of acetylcholine from the motor nerve terminals.[3] Chronic phenytoin therapy results in increased metabolism, increased enzyme induction, increased post-synaptic acetylcholine receptors, increased protein binding, and decreased sensitivity of receptors.[2]

Readers should be aware of such a cause of delayed awakening after acute phenytoin administration, due to alteration of the pharmacokinetic and pharmacodynamics of rocuronium, in chronically ill patients.

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