Sevoflurane Induction for Emergency Cesarean Section in a Parturient in Status Asthmaticus

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A PARTURIENT with status asthmaticus presents a disconcerting challenge to the anesthesiologist. In addition to the problems inherent in asthma and preterm labor, the pharmacologic effects of concomitant medications contribute to the dilemma of anesthetic management. Sevoflurane, a nonirritating volatile anesthetic with a low blood–gas partition coefficient, may be a suitable alternative with an asthmatic parturient in premature labor for emergency cesarean section.

Case Report

A 41-yr-old multiparous, woman (GgP5) at 33–34 weeks gestation was admitted because of an acute asthmatic attack, bronchopneumonia, and labor pains. Her medical history disclosed childhood onset of asthma and an acute exacerbation during the fifth month of pregnancy that required endotracheal intubation. She claimed to be “allergic” to salbutamol, aminophylline, and theophylline, manifesting as palpitations, headache, and confusion. On admission, she was dyspneic with respiratory rate of 24 breaths/min, intercostal retractions, and had cough productive of greenish phlegm. She was given oxygen with an inspired fraction of 32% via nasal cannula, nebulized with terbutaline alternating with fenoterol–ipratropium bromide every 4 h, and started on 100 mg intravenous hydrocortisone every 6 h; 750 mg cefuroxime every 8 h, and terbutaline drip at 15 μg/min for tocolysis. Laboratory examinations showed a hemoglobin of 9 g/dl, hematocrit of 0.29; serum sodium of 139 mEq/l, serum potassium of 2.2 mEq/l, and arterial blood gases with pH of 7.51, Pco2 of 44 mmHg, Po2 of 88.9 mmHg, HCO3 of 35.5 mEq/l, and an SpO2 of 97%. The rate of terbutaline infusion was reduced to 10 μg/min, and 35 mEq KCl was incorporated to the intravenous fluid.

On the fourth day of admission, respiratory rate increased from 24 breaths/min to 32 breaths/min, and she could not tolerate being in the supine position. She was then transferred to the intensive care unit (ICU). A continuous infusion of hydrocortisone at 0.4 mg·kg⁻¹·min⁻¹ and enoxaparin, 2000 U, daily was started. On the fifth hospital day, she became refractory to all medications and went into active labor. Repeat serum sodium was 139 mEq/l, and potassium level decreased to 2.0 mEq/l. Terbutaline was discontinued, and termination of pregnancy via vaginal delivery was planned. Oxytocin drip was then begun slowly. Several minutes later, spontaneous rupture of membranes revealed meconium-stained amniotic fluid, and fetal heart rate tracing showed prolonged episodes of deceleration. The oxytocin drip was discontinued, and the patient was prepared for emergency cesarean section.

Evaluation showed a restless parturient in sitting orthopnea, with inspiratory and expiratory wheezes, supraclavicular and intercostal retractions, and gasping between each word. Arterial blood gases revealed pH of 7.50, Pco2 of 48, Po2 of 235, HCO3 of 34, and SpO2 of 98% at Po2 of 100%. With maternal and fetal distress and the absence of a preexisting epidural catheter, general anesthesia was contemplated.

General anesthesia was induced with the patient in a sitting position using sevoflurane, 7%, in 6 l/min of oxygen after administering intravenous fentanyl, 50 μg. The patient was instructed to take several slow, deep breaths. Within 30 s, she no longer responded to verbal commands, but spontaneous ventilation continued. Oxygen saturation was maintained at 98% throughout induction. When cricoid pressure was applied, vecuronium, 0.1 mg/kg, (succinylcholine being unavailable in the hospital at this time) and lidocaine, 1.5 mg/kg, were given intravenously, with sevoflurane concentration maintained at 4%. The patient was ventilated gently via mask and bag and was intubated atraumatically after 2.5 min. Auscultation confirmed correct tube depth with occasional expiratory wheezes. Sevoflurane concentration was reduced to 2% at the time of surgical incision. A live baby boy was delivered 4 min after induction and within 1 5 min of surgical incision, with Apgar scores of 5, 8, and 9 at 1, 5, and 10 min, respectively. Immediately after placental delivery, uterine bleeding that amounted to 1.5 l was noted. Blood pressure dropped from 120/70 mmHg to 60/40 mmHg. Sevoflurane was temporarily discontinued to eliminate the possibility of its contributory role to blood loss. Oxytocin infusion was resumed immediately; plain lactated Ringer’s solution was infused rapidly, and intravenous ephedrine, 20 mg, was given. Uterine contraction improved, and bleeding was eventually controlled. After 3 min, blood pressure was stabilized at 100/70 mmHg, and sevoflurane was resumed and maintained at 2% concentration. The rest of the procedure was unremarkable. After surgery, the patient was brought to the ICU and was extubated within 2 h. She was transferred to the ward after two uneventful nights in the ICU and was subsequently discharged 4 days later.

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Discussion

A restless, dyspneic patient in the sitting position is not a good candidate for regional block as this may worsen oxygen delivery to the mother and fetus and aggravate the existing hypokalemia resulting from terbutaline therapy. The administration of enoxaparin also represents a relative contraindication. Local infiltration analgesia has been used for cesarean section, but because of the large volumes of local anesthetic required, toxicity is a potential risk. Presented with such a patient and fetal distress, general anesthesia for the emergent cesarean section was chosen.

Of the various intravenous induction agents, thiopental does not reliably protect against reflex-induced bronchospasm at clinical doses used for induction of anesthesia. A study by Pizov et al. demonstrated that wheezing occurred less frequently with administered propofol than with thiopental given before intubation. However, their study included patients who were not actively wheezing before induction. Although ketamine has been demonstrated to decrease airway resistance in patients with asthma and has been recommended for induction of general anesthesia for cesarean section at 1 mg/kg, investigations documenting the bronchodilatory effects of this agent generally use larger doses. In addition, its use in a patient with significant residual β-mimetic effects, i.e., hypokalemia and an elevated sympathetic tone, may induce hypertension and arrhythmias during induction.

Inhalation induction of anesthesia with sevoflurane has previously been described for emergency cesarean section in a parturient with no intravenous access. The low blood-gas solubility coefficient (0.69) of sevoflurane, the increased minute ventilation, and the decreased functional residual capacity and MAC observed during pregnancy all contribute to a rapid induction. The absence of airway irritation and bronchial effects of sevoflurane are effects beneficial to patients with asthma. Furthermore, sevoflurane is less arrhythmogenic than halothane and maintains hemodynamic stability even in the presence of the cardiovascular effects of β-mimetics.

The uterine bleeding and hypotension observed after placental delivery may be attributed to several factors. Studies on the role of preoperative administration of enoxaparin, a low molecular weight (LMW) heparin, on causing excessive intraoperative and postoperative bleeding have been equivocal. Although Dulitzki et al. in a report on their preliminary experience with LMW heparin in 41 pregnancies failed to detect any excessive intrapartum bleeding, a meta-analysis by Nurmoahmed et al. demonstrated that LMW heparin may be associated with more bleeding in general surgery patients. Sevoflurane, like other volatile anesthetics, can depress uterine contraction in a dose-dependent fashion and may contribute to blood loss. However, sevoflurane at 2% vaporizer concentration in this patient did not affect the uterine response to oxytocin, maintaining a contracted uterus for the entire operative period.

In summary, this case report described the successful use of sevoflurane inhalation anesthesia in a parturient in status asthmaticus for cesarean section resulting from fetal distress with good maternal and neonatal outcome. This case also demonstrates that sevoflurane might be a suitable induction agent in rare circumstances where other alternatives are not available.

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References