



Anesthetic Management in a Twin Pregnant Woman with Multiple Drug Allergies Undergoing Cesarean Section: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Patients with multiple drug allergies (MDA) can be in danger during anesthesia due to their possibility of anaphylaxis. Perioperative anaphylaxis can occur more frequently in patients with any kind of allergic history. The physiological changes during pregnancy, the existence of the fetus itself, and consequent restrictions on drug use including anesthetics make anesthetic management for pregnant women with MDA more difficult than that for other patients. Appropriate anesthetic strategy based on detailed history taking, allergological evaluations and cooperation between surgeon and anesthesiologist are essential to performing successful anesthesia. To the best of our knowledge, although there have been some cases about anesthetic management in patients with MDA, there is no reported case about surgical anesthesia for Cesarean section in a pregnant woman with MDA. Here, we present a pregnant woman with MDA who showed a positive response to most of anesthetics and analgesics in the intradermal skin test, successfully managed with an anesthetic strategy using volatile induction and maintenance anesthesia (VIMA) for Cesarean section.

Keywords: Multiple drug allergies; allergological assessment; Volatile induction and maintenance anesthesia; cesarean section.

1. INTRODUCTION

Patients with multiple drug allergies (MDA), especially on various anesthetic agents such as intravenous sedatives, hypnotics, opioids, neuromuscular blocking agents (NMBAs) and local anesthetics for general or regional anesthesia give various challenges to anesthesiologists [1]. It should be considered that patients with MDA undergoing anesthesia for surgery are at greater anesthesia-related risks such as anaphylaxis, airway hypersensitivity leading to airway obstruction and cardiovascular collapse which cause catastrophic events during perioperative period [2]. Especially, anesthesia of pregnant patients with MDA is more complicated because there are much more considerations and limitations on using anesthetic and analgesic drugs, airway management and fetal well-being during anesthesia of them [3,4].

Inhalational anesthetics including sevoflurane are considered safe in patients with MDA and has been used as there have been no reports of anaphylaxis (Type I hypersensitivity) related to volatile inhalational anesthetics [5-8]. However, the use of volatile anesthetics for anesthesia of twin pregnant women with MDA has the following challenges: volatile anesthetics are known to influence uterine muscle tone, and produce dose-dependent depression of uterine muscle contractility [9]. In addition, postpartum hemorrhage is a frequent complication in twin pregnancies [10] and the overall risk of postpartum hemorrhage after Cesarean deliveries is higher in women who receive general anesthesia than spinal or epidural anesthesia [11].

In this case, successful management in a twin pregnant woman with MDA undergoing Cesarean section using volatile induction and maintenance anesthesia (VIMA) is described.

2. CASE REPORT

A 34-year-old twin pregnant woman at 35 weeks gestation who had a past history of normal vaginal delivery was scheduled to have elective Cesarean section because one of the babies was much smaller than the other baby—and her amniotic fluid was insufficient for maintaining pregnancy.

She had allergic history such as urticaria and loss of consciousness to several antibiotics and non-steroidal anti-inflammatory drugs (NSAIDs). Given that she had never received general anesthesia in the past and her allergic history to a variety of medications, in order to prepare for a safe Cesarean section, intradermal skin test to various anesthetic agents were done. Ester local anesthetics were excluded from the test because they are not able to be prescribed in our hospital. It was revealed that all of anesthetic agents except etomidate were positive or borderline positive (Table 1).

Table 1. Intradermal skin tests for anesthetic agents

Drug	Result
Thiopental	Positive
Propofol	Positive
Midazolam	Positive
Etomidate	Negative
Ketamine	Borderline positive
Fentanyl	Positive
Succinylcholine	Positive
Rocuronium	Positive
Atracurium	Borderline positive
Bupivacaine	Positive
Lidocaine	Positive

Pre-anesthetic interview was done the day before the surgery. We discussed with the patient about various anesthetic strategies, including general anesthesia with only using of etomidate, ketamine, and atracurium that were shown to negative or borderline positive to intradermal skin test, or volatile induction and maintenance anesthesia (VIMA) with only volatile anesthetics such as sevoflurane. That is, we fully explained possible events and potential complications related to various anesthetic strategies and then obtained written informed consent from the patient.

After thorough discussion with the patient and obstetricians, we decided not to use etomidate because it is a Category C drug for pregnant women and is not commonly used in Cesarean section. We decided not to use other anesthetic agents which were allergic to patient because of the potential risk for anaphylaxis. We, therefore, decided to perform VIMA using sevoflurane alone.

Prophylactic steroid was used to reduce the risk of anaphylaxis before surgery. Emergency airway devices such as various size of endotracheal tubes, video laryngoscope and laryngeal mask airways (LMAs) were prepared. Epinephrine bolus was prepared to be diluted as 100 µg/mL and 10 µg/mL solutions. After the patient arrived at operation room, electrocardiography, pulse oximeter, and electroencephalograph monitoring device (Sedline®, Masimo, Irvine, CA, USA) were placed and monitored. Arterial line was placed on her right radial artery to obtain continuous blood pressure monitoring before induction. Pre-oxygenation with 100% oxygen of 15 L/min of flow rate was done for 5 minutes with face mask. At induction, 6% sevoflurane in 100% oxygen of 15 L/min gas flow rate was used, and LMA was placed for securing airway maintenance without using any NMBA. There were not any problems related to difficult airway such as limited neck extension, limited mouth opening and high grade of Mallampati and Cormack-Lehane grade. Anesthesia maintained with 3-4% sevoflurane before babies were delivered. We tried to reduce sevoflurane concentration because sevoflurane can interrupt uterine contraction which may affect postpartum hemorrhage. The first-born baby's Apgar scores were 6 and 9 at 1 and 5 minutes respectively, and heart rate was above 100 beat per minute and oxygen saturation was maintained between 75% and 88% via room air. The second-born baby's Apgar scores were 5 and 8 at 1 and 5 minutes respectively, and heart rate was above 100 beat per minute and oxygen saturation was maintained between about 70% and 80% via room air. After babies were born, 50% nitrous oxide was added, and sevoflurane concentration was reduced to 1%. During the entire period of anesthesia, vital signs were stable with no events of hypotension, unconsciousness was maintained with patient state index (PSI) below 50 from Sedline® monitor, and there was no any involuntary movement except weak self-respirations. An end-tidal carbon dioxide level was maintained between 30 to 35 mmHg. Self-respirations were controlled with hyperventilation by intermittent manual bagging. Operation finished, sevoflurane and nitrous oxide were ceased. When end-tidal sevoflurane and nitrous oxide concentrations were decreased to the minimal alveolar concentration (MAC) of 0.2, PSI increased to 80 or more. Soon, she could open both eyes as instructed and breathe voluntarily with adequate tidal volume, and then LMA was removed. Her consciousness and self-respiration were

recovered adequately to be transferred to the post-anesthetic care unit. The patient confirmed that there was no recall event during anesthesia. Oral acetaminophen has not been allergic to the patient and oral provocation test for acetaminophen was negative in the past, so intravenous paracetamol 1 g was administered per every 8 hours for postoperative pain control. There were any complications and adverse events during entire perioperative period until discharge.

3. DISCUSSION

The present case reported an anesthetic management for a twin pregnant patient with MDA undergoing Cesarean section. The anesthetic strategy, using VIMA with sevoflurane concentration adjustment before and after the delivery, led to the good outcome for the both mother and babies.

Anaphylactic reactions during anesthesia are not common, but can cause catastrophic adverse events such as severe brain damage and even death [3,12]. The main risk factor for perioperative anaphylaxis is a previous immediate hypersensitivity reaction [2]. So, any patients who have experienced allergic reaction to drugs or foods need detailed history taking and allergological evaluations, including allergic skin tests and allergen-specific IgE antibody tests [2,10].

All emergency drugs and equipments must be prepared for any possible emergent problems during anesthesia before induction, especially vasopressor such as various diluted solution of epinephrine and advanced airway equipment such as various size of endotracheal tubes and blades, direct and video laryngoscope, nasal or oral airways, and LMAs.

We used LMA for advance airway instead of endotracheal intubation. It has been known that the risk of aspiration during induction of anesthesia is higher with LMA than endotracheal intubation. However, this risk may have been overestimated [13]. There have been many cases of the use of LMA in Cesarean section with little or no adverse events such as aspiration, bronchospasm or desaturation [13-16]. Furthermore, LMA has advantages over endotracheal intubation such as less hemodynamic stimulation, reduction in the time to effective ventilation and higher success rate [16,17]. Because we were not able to use opioids

or NMBAs, in terms of hemodynamic stability, LMA can be more profitable than endotracheal intubation.

Inhalational anesthetics including sevoflurane has been considered to be safe in patients with

MDA, and there have been no reports of anaphylaxis to inhalational anesthetics [5,6]. For this reason, we used sevoflurane as the treatment of choice for anesthetic management. There are some reported cases in which general anesthesia was performed in patients with MDA under VIMA with sevoflurane and nitrous oxide [6,8]. The intra- and postoperative courses were uneventful in these cases. Nevertheless, there has been no reported case about surgical anesthesia in the patient with MDA and for Cesarean section.

There are various limitations of performing anesthesia in pregnant patients with MDA. Basically, many drugs are not usable in pregnant women. Maternal blood pressure is most important to maintain adequate placental perfusion. Hemodynamic changes are common during obstetric anesthesia, which may delay the diagnosis of an allergic reaction [3]. Maternal hypotension may reduce placental perfusion and then fetal distress can occur. If severe fetal distress occurs, it can produce permanent brain damage of babies. On the other hand, adequate depth of anesthesia enough to proceed surgery is important. But volatile anesthetics including sevoflurane can cause inadequate uterine contraction which may lead to postpartum hemorrhage. Therefore, the sevoflurane concentration should be administered only in an amount necessary to induce unconsciousness in the patient without being excessive.

Neuraxial anesthesia may be considered in a patient with MDA. Rarely, cases of anaphylaxis have been reported after spinal or epidural anesthesia [4,18]. Hypotension is more frequent in neuraxial anesthesia rather than general anesthesia, and securing immediate airway management may be delayed in neuraxial anesthesia. Because of these factors, fetal compromise is more prominent during neuraxial anesthesia [18]. Moreover, the patient, in this case, showed a positive response in the allergic skin test for local anesthetics and thus neuraxial anesthesia was impossible, and VIMA was performed to the patient.

4. CONCLUSION

In this case, we could successfully proceed anesthetic management using VIMA in a twin pregnant woman with MDAs -< MDA. We suggest that in a pregnant woman with MDA, inhalation-based general anesthesia can be considered as a safe anesthetic management method and can reduce a risk of perioperative adverse events due to allergic reactions. In addition, we recommend that detailed history taking and thorough pre-operative allergological evaluation should be performed, and sufficient discussion and cooperation between anesthesiologist and surgeon/patient are required to provide successful perioperative anesthetic and surgical management.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, written consent obtained from the patient has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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