

Anaphylactic Shock Reaction Caused By The Anesthetic Drug Cyclopropofol During General Anesthesia: Case Report And Literature Review

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Abbreviations: BP-Blood Pressure; ETCO₂-End-Tidal Carbon Dioxide; HR-Heart Rate; IV-venous; SpO₂-Blood Oxygen Saturation.

Abstract

Cyclopropofol, a sedative similar to propofol, is commonly used in clinical practice due to its perceived safety. However, it is important to note that despite its short history of use, cyclopropofol can potentially cause systemic anaphylaxis, although cases of allergic reactions to cyclopropofol have not been reported thus far. In this study, we present a case of anaphylactic shock resulting from the intravenous pump infusion of cyclopropofol during general anesthesia.

1. Introduction

Anaphylaxis is a significant concern in general anesthesia surgery, and anaphylactic shock remains a major cause of adverse reactions and even death during anesthesia. The reported incidence ranges from 1/20,000 to 1/3500, with a mortality rate of 3% to 6% [1-3]. Despite advancements in medicine making anesthesia practice safer, patients are still exposed to various foreign substances during the perioperative period, including anesthetic drugs (such as sedatives, analgesics, muscle relaxants), antibiotics, blood products, and disinfectants. These substances have been known to cause different types of expected or unexpected adverse reactions [4]. As an anesthesiologist responsible for patient safety and medical well-being, it is crucial to prevent allergic reactions and promptly diagnose and treat allergies when they occur.

Cyclopropofol is a sedative-hypnotic drug. Its sedative and anesthetic effects have been proven many times to be no worse than propofol in the induction and maintenance of anesthesia during hysteroscopy, gastroenteroscopy, and intubation. Because it has less inhibitory effect on breathing and circulation than propofol and no injection pain, it is currently widely used as a substitute for propofol in clinical practice. Several studies have shown the safety of cyclopropofol in anesthetic applications, and to our knowledge, we are the first to report a patient experiencing anaphylactic shock due to cyclopropofol infusion during general anesthesia.

The patient have given written consent for publication of this case.

2. Case report

A 47-year-old patient, who weighs 85kg and is 178cm tall, planned to undergo debridement and suturing of lumbar infected wound because of postoperative wound infection due to posterior approach lumbar discectomy 9 days ago. Preoperative test results and physical examination revealed nothing of particular concern.

When the patient entered the room, the electrocardiogram showed normal, cuff BP was 127/85mmHg, HR was 79 beats/min, SpO₂ was 100%, and body temperature was 36.5°C. At 15:25 we let him inhale 100% oxygen, intravenously inject 25 mg of cyclopropofol,

2 mg of midazolam, 14 mg of cisatracurium, 30 ug of sufentanil, and 14 mg of etomidate for anesthesia Induction. 3 minutes later, tracheal intubation was successful. Then cuff BP showed 127/92mmHg (1 mmHg = 0.133 kpa), HR was 80 beats/min, machine-controlled breathing volume mode was 450ml, frequency 12 times/min, Peak=12-15, inhale 60% O₂, exhale ETCO₂ 30-45 mmHg. Remifentanil 0.5 ~ 1mg/h and cyclopropofol 20-30mg/h were continuously infused, and sevoflurane 1% concentration was used to maintain anesthesia. After intubation, arterial blood gas (60% oxygen) analysis was performed. The blood gas analysis results showed PH=7.318, PO₂=271mmHg, PCO₂=42.9mmHg. Ten minutes later, the patient suffered blood pressure dropped. The cuff BP was 70/52mmHg, the HR was 60 beats/min, the SpO₂ was 99%. At the same time, lots of erythema was observed on hands and forearms of the patient, and it was considered that the patient had severe allergies. Immediately we gave him metahydroxylamine 0.1 mg. Multiple times, we intravenously inject 10 mg dexamethasone, 10% calcium gluconate 10 ml, and speed up fluid replenishment. After 15:45, the cuff BP was still 80/55mmHg, the HR was 65 beats/min, the SpO₂ was 98%, Peak=12, and there was no obvious wheezing in both lungs; epinephrine was given 0.1mg iv., the posterior cuff BP was 90/58mmHg, the HR was 60 beats/min, and SpO₂ was 98%; Then the patient was changed to prone position to start the operation. After the operation started, the patient's blood pressure was still unstable, so 10% norepinephrine was continuously pumped to maintain BP. Within about half an hour, the cuff BP was maintained at 78-84/55-60mmHg, HR maintained 55-60 beats/min, SpO₂ 98-99%, Peak=12-15, ETCO₂ fluctured 35-38 mmHg. 15 minutes later, the patient underwent puncture and catheterization of the left radial artery and pressure measurement. Within about 15 minutes, the invasive blood pressure was maintained at 58-80/40-55mmHg, and the HR was 50-60 beats/min. At 16:30, 10% norepinephrine was stopped and replaced with 0.4% norepinephrine and 0.2% epinephrine to continuously pump to hold on blood pressure. About 10 minutes after stopping cyclopropofol, the patient's heart rate increased to 70 beats/min, and the invasive blood pressure was 95/65mmHg. After about an hour and a half, the heart rate remained stable at 70-82 beats/min, and the invasive blood pressure remained stable at 95-110/50-60mmHg. Then slowly reduce the pumping speed of norepinephrine until it is stopped, and use 0.2% epinephrine alone to continue pumping to maintain blood pressure stability. At 18:40 we slowly reduced the adrenaline pump speed to 0.2% until it is deactivated. Invasive blood pressure was maintained at 100-135/60-70mmHg, and heart rate was maintained at 78-88 beats/min. After the patient's basic condition became stable, we slowly reduced the 0.2% epinephrine pump speed until it is discontinued. The patient found no discomfort after half an hour of observation and returned to the ward safely at 21:10. The patient did not have any postoperative complications. A skin test is performed 6 weeks later confirmed that the patient was allergic to cyclopropofol.

4. Discussion

Anaphylactic shock caused by anesthetic drugs during anesthesia is a life-threatening condition that is independent of the dose of anesthetic drugs. The most common triggers include muscle relaxants, antibiotics, latex, and cyclooxygenase inhibitor-type analgesics [4,5]. However, in the event of an allergic reaction, all anesthetic drugs and other sources of exposure should be suspected [6]. In this article, after stopping the infusion of cyclopropofol for observation, and conducting a skin test 6 weeks later, it was finally confirmed that the culprit of the anaphylactic shock during general anesthesia surgery was cyclopropofol.

Cyclopropofol, like propofol, its mechanism of action is unclear. Propofol has been a safe and effective sedative drug in clinical anesthesia since its introduction and performed positive regulation to produce anesthesia. Adverse reactions such as hypotension, respiratory depression, injection pain, and allergic reactions occur occasionally [7,8]; cyclopropofol is used as a substitute for propofol. It has been proven to be no worse or even better than propofol in terms of hypotension [9-12], respiratory depression, and injection pain, but its possibility of causing allergic reactions should not be ignored. As reported in this case, the patient did not experience any allergy-related or suspected allergy-related adverse reactions when using propofol under general anesthesia 9 days ago, but this time Severe anaphylactic shock requiring rescue was caused by the administration of cyclopropofol during surgery.

Pinpointing the allergen may be difficult or time-consuming, but identifying and treating anaphylactic shock quickly is imperative. For patients undergoing tracheal intubation under general anesthesia, the patient loses consciousness and the ability to speak. External symptoms such as itching or rash may be missed during the operation. In addition, anesthetic drugs themselves have an inhibitory effect on the circulatory system, which may cause the anesthesiologist to miss important signs of decreased blood pressure

and bradycardia. However, rapid identification and diagnosis can be based on standards. Quickly determine allergies based on the patient's symptoms and signs, lock in certain drugs after stabilizing the patient's breathing and circulation, and then confirm the diagnosis based on some skin tests or enzyme tests [13-15].

In short, this report is the rare one of anaphylactic shock caused by cyclopropofol during general anesthesia. As a new drug substitute for propofol, cyclopropofol should still be used with caution in people with a history of allergies or the possibility of allergies or other uncertain situations on patients.

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