

Propofol Induced Anaphylactic Shock in General Anesthesia-A Case Report and Literature Review

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Abstract

Perioperative anaphylaxis caused by drugs is an important factor associated with narcotic mortality. Most of drugs administered during the anesthetic period have the potential to cause adverse reactions. Anaphylactic shock is a severe allergic reaction with a high fatality rate. Although the incidence is fairly low, the consequences can't imagine, especially in the process of general anesthesia, which will increase the difficulty in diagnosing anaphylactic shock. Meanwhile, because it is rather difficult to determine the definite cause for anaphylactic shock, there is very few related documentation of anaphylaxis, and only few patients can receive allergy testing to do the confirmation. In this case, there is a 53 year-old woman proposed for thyroid surgery, has suffered from anaphylaxis during the general propofol-maintaining.

Keywords: Anaphylactic shock; Propofol; General anesthesia

Introduction

Propofol is a widely-used intravenous anesthetic in the clinical, composed of soy oil, lethicin, and glycerol as the solution. It is a short-acting anesthetic, which is often administered for induction and maintenance of general anesthesia. Allergic reactions to propofol are uncommon and account for less than 2% of all reactions to general anesthetics [1].

As anesthetists, we must be familiar with the rare responses to all drugs, in order to prevent complex and serious complications. We reported a case of propofol-maintenance anaphylaxis with hypotension, tachycardia and arrhythmia during anesthesia.

Case Report

Because the patient had been already suffering from the compressing symptoms in the neck and then asked for a surgery, we did a careful preoperative evaluation and preparation, and then executed the procedure for 2 days after the admission. The weight of the patient is 62 kg. ASA level II, the patient would accept the total thyroidectomy. In the operating room, ECG BP HR SpO₂ BIS was monitored and upper limb venous circuit was established. The monitor showed BP 159/100 mmHg, HR 87 bpm, SPO₂ 98%, BIS 99, ECG sinus rhythm. Then general anesthesia was induced by the administration of midazolam 1 mg IV, penehyclidine hydrochloride 0.5 mg IV, dexamethasone 5 mg IV, fentanyl 0.3 mg IV, rocuronium 40 mg IV, etomidate 18 mg IV. Endotracheal intubation was then committed after appropriate muscle relaxed and then mechanical control of ventilation was administered. 0.25% ropivacaine was utilized for superficial cervical plexus blockade, 7-8 ml for each side. Maintenance of general anesthesia was accomplished with infusion of propofol 200 mg per hour and remifentanyl 0.333 mg per hour, which were continuously pumped intravenously. Left dorsalis pedis artery was

successfully cannulated for invasive blood monitor and the waveform arterial was normal.

At the moment, invasive blood pressure reached 156/96 mmHg, HR 78 bpm, SpO₂ 100%. However, 10 m later, the wave of invasive decreased, ECG monitor showed BP 89/45 mmHg, HR 138 bpm, and invasive blood pressure was immediately measured to be 74/39 mmHg. Ephedrine (10 mg) and the phenylephrine (40 ug) were administered. But the invasive blood pressure continued to drop down to 54/34 mmHg, HR 135 bpm, and ECG demonstrated ST duration decreased significantly, frequent ventricular premature, occasional duet.

Considering the emergency condition of shock, we ceased all surgical operation and stopped infusion of propofol and remifentanyl. At the same time, norepinephrine 2 mg i.v. was injected and dopamine 20 mg i.v. slowly injected. Then 10 min later, monitor showed BP 95/43 mmHg, HR 125 bpm, and ECG: ST segment responded to the equipotential level. 20 min later, monitor showed BP 125/65 mmHg, HR 98 bpm, and ECG: ST duration recovered to the baseline. Hence the surgery continued. As autonomous respiration wave found within her ETCO₂, we continued infusion of propofol. One minute later, the monitor showed BP 76/38 mmHg, HR 152 bpm, and the ECG: ST duration decreased significantly, frequent ventricular premature. In consideration of the possibility of propofol induced shock, we ceased propofol infusion immediately and administered inhalation of sevoflurane simultaneously, and administered dopamine and cedilanid. Heavy sweat was found on her face. 10 min later, HR recovered to 103 bpm, and ECG: ST duration recovered slightly. 20 min later, monitor showed BP 121/67 mmHg, HR 95 bpm, and ECG: ST duration recovered to the baseline. By the end of the surgery, situation of circulation and respiration remained stable, and ECG was normal. The changes of HR and systolic blood pressure (SBP) during the entire anesthetic period were recorded (Figure 1).

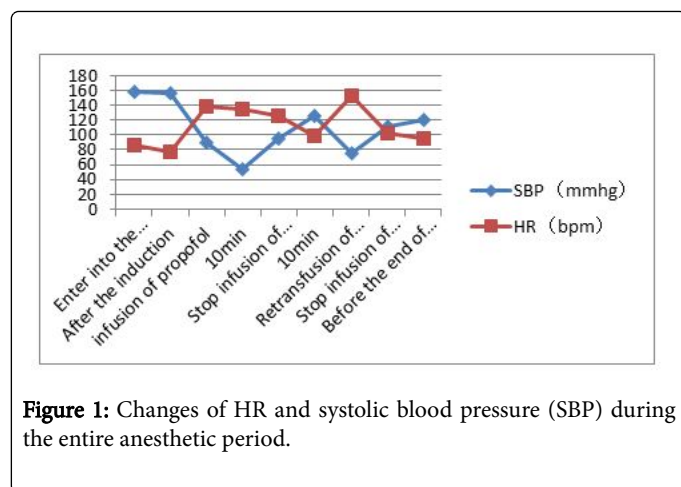


Figure 1: Changes of HR and systolic blood pressure (SBP) during the entire anesthetic period.

The operation lasted 1 h 5 m after the surgery, the patient recovered conscious and we pulled out the endotracheal intubation. Then the patient was sent to the postoperative observation room when Steward scored 6. No any other abnormal phenomena were detected, or hemodynamic complications were reported during the rest of the intraoperative period.

The frozen section pathology was also examined with follicular lesion and total thyroidectomy was committed. The patient was discharged from the hospital 6 days later, and pathology reported Hurthle cell tumor with undetermined malignancy potential.

Discussion

Serious allergic events were rare during anesthesia and the perioperative period. However, it can rapidly evolve into life-threatening situation without rapid and prompt recognition and management [2].

Anaphylactic shock is cell impairment and malfunctioned pathological state, which is often caused by decreased systemic angiotensin and tissue hypoperfusion. It often occurs suddenly and rigidly, with severe anaphylactic reactions in multiple organs and main damage in the circulation system and respiration system. If no timely and proper treatment was carried out, it will be usually fatal.

After the resolution of the case and reviewing the events, the anesthetist thought it might be anaphylactic. The patient suddenly suffered from the blood-pressure dropping down, the heart-rate accelerating, as well as the arrhythmia, and the worse was that she did not respond to the regular vasopressors ephedrine and phenylephrine. After the cessation of propofol and remifentanyl, the patient's situation tended to be stable. Therefore, we inferred that the shock was anaphylactic and probably induced by propofol, but not very sure. To maintain anesthesia, propofol was administered once again, and then shock emerged. When propofol was ceased, the patient's situation became stable again. Now we could be sure that it was propofol that induced the anaphylactic shock. Furthermore, the patient has used benapril, a long-acting angiotensin converting enzyme inhibitor, to control her hypertension for a long time. Additionally allergic shock occurring during the operation, will further lead to heavier circulatory failure.

Propofol is a widely-used intravenous anesthetic in the clinical. It was 10 mg/ml, which could induce 66.7% of all total anesthesia associated anaphylactic reactions [3].

Propofol activates GABA receptor chloride ion compound, and exerts sedative and hypnotic effects. It has been proved that the anaphylactic reactions induced are mainly conducted by histamine, and the clinical symptom is related to the concentration of histamine. However, the severe allergic reaction such as shock is relatively rare, which is considered to be induced by its excipients, such as lethicin and soybean oil contained in propofol emulsion. However, the mechanism is still controversial.

In this case, etomidate was used for anesthesia induction, which also contained emulsions, but it did not induce anaphylactic reaction. Hence, we conclude that it is propofol itself, rather than emulsions, which induced the severe anaphylactic shock in this situation.

As an anesthesiologist, it is important to investigate the food or drug allergic history preoperatively, and intraoperative vital signs must be closely monitored, skin of the patient be closely watched, to notice signs of anaphylactic reactions as early as possible. Once severe anaphylactic shock was noticed, prompt action should be initiated, which include:

1. Cut off the anaphylactogen immediately, of which the antibiotics, traditional Chinese medicine or bio-product, are most commonly used (about 78.22%) by intravenous pathway. When anaphylactic shock occurs, allergens should be removed immediately. If the patient is intravenously administered, the intravenous infusion and administration should be stopped and the infusion and pipeline should be removed, but the venous pathway should be preserved.

2. Rapid fluid replacement was performed. At the same time, epinephrine, dopamine, and hydrocortisone were administered. In addition, antihistamine drugs like diphenhydramine and chlorphenamine could be administered to relief skin associated symptoms. For severe anaphylactic reactions, epinephrine given immediately could prevent upper and lower airway obstruction and relief shock [4]. Otherwise, death will occur if epinephrine was not given in time or insufficiently. Since glucocorticoid does not take effect quickly enough, it only could be used as adjuvant, but not be used on first-line treatment. Promethazine could lead to respiration inhibition among children under 2 years old, so it should be forbidden to use for them [5].

In the present case, the anaphylactic shock has not been immediately identified, so the anaphylactogen was not cut off immediately. When the blood pressure lowered, we tried vasopressor. Until the blood pressure continuously lowered, as well as tachycardia and arrhythmia emerged, we considered the possibility of anaphylactic shock and then took corresponding measures in time. All the evaluation and study were conducted according to the extensive knowledge of anesthesia, and it is paramount for the anesthetist to be prepared to manage the serious events.

Conflicts of Interest

With an increasing use of new drugs in clinic, the variety and range of drugs which induce anaphylactic shock are increasing and expanding. In fact, any unexplained life-reactions are major risk factors for a renewed reaction if the corresponding drug is re-administered [6].

Once anaphylactic reactions occurred, the consequences could be severe. Therefore, it is very important to identify and closely monitor the anaphylactic reactions induced by anesthetics.

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