Dilemmas in Anesthetic Management of a Patient with History of Anaphylaxis to Vecuronium

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Abstract

Anaphylaxis during anesthesia is a life-threatening situation that occurs uncommonly. A 60-year-old woman with a history of anaphylaxis during previous anesthesia is scheduled to undergo elective open cholecystectomy. Her skin tests revealed sensitivity to vecuronium and nonsensitivity to injections of midazolam, fentanyl, and propofol. Due to high incidence of cross sensitivity among neuromuscular drugs, it was thought best to avoid general anesthesia. Spinal anesthesia was planned for the patient. The patient refused to give consent for spinal anesthesia, and she had to be taken up for surgery under general anesthesia. The only alternate neuromuscular blocking drug available to us was atracurium, which was tested for sensitivity by intradermal test. Atracurium was found to be not sensitive on intradermal test. We report here the dilemma and the challenges faced during management of general anesthesia in a patient with history of anaphylaxis to vecuronium.

Keywords: Anaphylaxis, cross sensitivity, vecuronium

INTRODUCTION

Neuromuscular blocking drugs (NMBDs) account for 60% of all anesthesia induced anaphylaxis cases.[1] Complete avoidance of the general anesthesia and triggering NMBD in next anesthesia is the best option. Skin tests are useful to find a nonsensitive NMBD for general anesthesia in patients with a history of anaphylaxis to an NMBD.[2] The challenges faced in the management of a subsequent anesthesia in a patient with a history of anaphylaxis to vecuronium are described here.

CASE REPORT

A 60-year-old female, weighing 57 Kg, ASA physical status Class II, scheduled to undergo open cholecystectomy presented for preanesthetic check-up in our tertiary care hospital. She had a history of an allergic reaction during anesthesia 4 months back in another hospital when she was posted for the same surgery. Brief notes of previous anesthesia revealed that the patient was given injections of midazolam, fentanyl, propofol, and vecuronium intravenously in the given sequence. After few minutes of intubation, she had developed hypotension, bradycardia and swelling over the face and the whole body. She was managed as a case of suspected anaphylaxis with adrenaline, antihistaminics, steroids, and crystalloids given intravenously. She responded to the treatment. She became hemodynamically stable and swelling over face and body decreased gradually. Her surgery was deferred. She was extubated and shifted to the Intensive Care Unit (ICU) on oxygen inhalation by mask for observation. She remained hemodynamically stable in ICU. She did not require any inotropes and by morning swelling over her face and body had completely subsided. She maintained SpO₂ of 97–98% on room air. She was shifted to the ward by afternoon. There was no mention of serum tryptase levels in the notes. She was sent for skin prick test and intradermal test after 6 weeks to an allergy clinic both of which were positive and confirmed IgE-mediated immune reaction to vecuronium. She was found to be not sensitive to midazolam, propofol, and fentanyl on skin testing. The patient was referred to our hospital for surgery and anesthesia. The patient gave a history of having undergone a cataract surgery under peribulbar block using bupivacaine and lignocaine 10 months back and a laparoscopic surgery for...
ligation of fallopian tubes 20 years back under local anesthesia and sedation. She was a diabetic well controlled on oral hypoglycemic drugs. There was a history of back pain since 2 years. There was no history of asthma or any other drug or food allergy. There was no other significant finding on history, examination, and investigations.

The patient was planned for regional anesthesia, but patient did not give consent for spinal/epidural anesthesia due to a backache. The alternate plan was a general anesthesia using an NMBD, which was not sensitive on intradermal test as surgeons required good abdominal muscle relaxation. Informed consent for high risk of anaphylaxis was taken, and a bed in ICU was reserved as a precautionary measure. All the drugs such as adrenaline, steroids, and antihistaminic drugs were loaded in syringes and equipment required for resuscitation and management of anaphylaxis was kept ready.

The only alternate NMBD available to us was atracurium. On the day of surgery, Patient was shifted to the operating room. Monitors for SpO2, ECG and blood pressure, were attached, and intravenous access was established. The patient was given an intradermal injection of atracurium (10 mg/ml solution diluted to 1:1000 in saline) to raise a bleb of 4 mm in diameter on the volar surface of forearm according to the guidelines.[2] The test was read and interpreted according to the guidelines at 20 min, and there was no wheal and size of the bleb did not double or become more than 8 mm in diameter.[3] The patient was found to be not sensitive to atracurium.

Her preoperative pulse rate was 70/min; blood pressure was 140/90 mm Hg and SpO2 was 98% on room air. Air entry was bilaterally equal on auscultation of the chest. Another large bore intravenous cannula was inserted, and the patient was preloaded with 500 ml of Ringer’s lactate solution. Premedication was done with injection hydrocortisone 100 mg, injection pheniramine maleate 22 mg, and ranitidine 50 mg intravenously (blockers of histamine 1 and 2 receptors). The patient was preoxygenated with 100% oxygen. Injection fentanyl 2 μg/kg and propofol 1.5 mg/kg titrated to loss of verbal response were given separately and slowly intravenously. Muscle relaxation was achieved with injection atracurium (0.5 mg/Kg) given slowly intravenously over 2 min to prevent histamine release. After 3 min of ventilation ProSeal laryngeal mask airway, number 3 was inserted, and its correct placement was confirmed by bilateral auscultation of chest and square wave capnography. Anesthesia was maintained with isoflurane 0.6–0.8% in 1:2 mixture of oxygen and nitrous oxide. One supplemental dose of atracurium 5 mg was given intravenously. Intraoperatively, hemodynamic parameters and SpO2 were well maintained. No tachycardia, bradycardia, hypotension or bronchospasm was noted. The surgery lasted 75 min and total anesthesia time was 100 min. Intra- and post-operative analgesia was maintained with hourly bolus doses of fentanyl and infusion of paracetamol 1 g given 8 hourly intravenously. The patient had received paracetamol several times without any reaction before this surgery. Wound infiltration was done with 0.25% of bupivacaine as it had been given previously two times without any reaction. The patient was reversed with injection neostigmine 0.05 mg/kg and injection glycopyrrolate 0.01 mg/kg given intravenously, which were not tested as patient had already received them uneventfully in previous anesthesia. The patient was shifted to postoperative recovery room and monitored for 4 hours. She maintained stable hemodynamic parameters and SpO2 of 98% on room air. She was shifted to the ward and subsequently discharged after 3 days. She was given a letter containing all the details of her tests, safe and unsafe drugs and anesthesia procedure.

**DISCUSSION**

A patient with clinically suspected anaphylaxis must undergo allergologic investigations.[2] In our patient, skin tests comprising of skin prick test and intradermal tests were carried out (6 weeks after the reaction) for all the drugs that were given before the anaphylactic reaction occurred, as recommended.[2] This helped us to pinpoint the triggering agent vecuronium and identify the safe drugs for future anesthesia. A positive skin test also confirms an IgE-mediated reaction.[2]

NMBDs can cause both IgE-mediated and non-IgE-mediated hypersensitivity reactions. Cross-sensitivity between NMBDs occurs frequently and is due to the quaternary ammonium structure present in all neuromuscular blocking agents.[2,3] Rate of anaphylaxis is higher with succinylcholine and rocuronium as compared to atracurium and vecuronium.[4]

The skin tests for NMBDs have a sensitivity of 94–97% in the patients with previous history of anaphylaxis.[5] However, data on negative predictive value of these tests are limited as such studies would require dangerous, provocative tests with NMBD.[6]

Due to frequent cross sensitivity among NMBDs and severity of anaphylactic reactions, it is recommended to avoid NMBDs in subsequent anesthesia and use of regional or local anesthesia is advocated wherever possible.[7] Our patient refused to give consent for spinal/epidural anesthesia due to a severe backache. It is recommended to use inhalational anesthesia with opioids if regional anesthesia cannot be given.[7] The alternative plan could have been a general anesthesia without muscle relaxant using inhalational agents, opioids, and either an interpleural block or a thoracic paravertebral block. This option was not considered as surgeons anticipated it to be a difficult surgery with lots of adhesions of gallbladder to the adjacent structures due to longstanding history of repeated attacks of cholecystitis. Surgeons required a good abdominal muscle relaxation to facilitate surgery that was possible only with muscle relaxants. This difficulty in surgery was also the reason why the patient was posted for open and not laparoscopic cholecystectomy. With all these issues in mind, we decided in favor of general anesthesia with a muscle relaxant that would test negative on the skin test.
An intradermal test for atracurium was carried out in the operation theater as it is recommended that these skin tests should be done by trained physicians with all facilities for resuscitation ready due to the risk of anaphylaxis.[2] The concentration of the drug atracurium for intradermal test did not exceed the maximum nonirritant concentration recommended to avoid false positive result and the diagnostic criteria for test result interpretation used by us was according to the published guidelines.[2]

However, as recommended in the guidelines, we were very cautious while anesthetizing this case of previous anaphylaxis due to chances of recurrence this time despite complete avoidance of the triggering agent.[7] An ICU bed was kept reserved. We were ready with all the drugs, fluids, equipment, and extra staff required to help in resuscitation and treat anaphylaxis. Establishing two large bore intravenous lines, preloading with 500 ml of crystalloid solution before induction to counter the vasodilatation and capillary permeability that could occur due to anaphylaxis and preoxygenating the patient before induction were also part of precautionary measures.

Premedication with single dose of steroid and antihistamines will not prevent an IgE-mediated hypersensitivity reaction.[2] We administered them prophylactically as antihistaminic drugs may decrease the incidence and intensity of a reaction due to non-IgE mediated histamine release.[7] Avoiding histamine-releasing drugs like morphine and injecting drugs slowly and separately also helped prevent it.[7]

Latex free environment was not considered as the patient had already undergone two operations without any adverse reaction to latex.[7]

In a published case series by Fisher et al.,[8] all 176 cases and in another by Lysen et al.,[6] all 12 cases underwent a subsequent anesthesia with the alternate NMBA chosen on the basis of negative skin tests without any anaphylactic reaction. A combination of negative skin tests and negative basophil activation tests was found to have excellent predictive value and IgE assay for the specific allergen was less clinically predictive.[6]

Bouaziz and Laxenaire also advised to repeat skin tests before anesthesia if the previous test was done 2–3 years prior due to likelihood of acquiring new sensitivities.[9] Such patients should be provided with a letter and a medical-alert band carrying all information about the anaphylactic reaction, details of testing, and subsequent anesthesia with names of safe drugs for future safe surgery and anesthesia.[7]

Our case report demonstrates that a patient of anaphylaxis to vecuronium for subsequent anesthesia can be safely managed with an alternate NMBA atracurium chosen on the basis of negative skin test. However, high index of suspicion and preparedness to deal with anaphylaxis is of paramount importance in such cases.

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**Conflicts of interest**

There are no conflicts of interest.

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