Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/mjafi

Case Report

Two cases of anaphylaxis under anaesthesia with vecuronium

Wg Cdr Parli R. Ravi^{a,*}, Wg Cdr M.N. Vijay^a, Gp Capt Sachin Shouche^b^a Classified Specialist (Anaesthesiology), Command Hospital (Air Force), Bangalore 560007, India^b Senior Adviser (Anaesthesiology), Command Hospital (Air Force), Bangalore, India

ARTICLE INFO

Article history:

Received 27 April 2013

Accepted 4 October 2013

Available online 16 December 2013

Keywords:

Anaphylaxis

Intra-dermal skin test

Vecuronium

Introduction

Patients undergoing surgery under general anaesthesia are administered multiple drugs in a very short span of time. Various side effects can occur due to reactions to the drugs provided, with anaphylaxis being a life threatening reaction. Although anaphylaxis is a rare side effect, it can lead to death if not diagnosed and treated quickly. Moreover, identifying the causative agent is the most important procedure to prevent a recurrence. We present here two cases of anaphylaxis under anaesthesia.

Case report

Case 1

43-year-old female patient with a BMI of 24.7 kg/m² was scheduled to laparoscopic assisted vaginal hysterectomy. She

had neither underlying medical disorders nor allergic reactions to medications or food, and there was no family history of allergies. There were no abnormalities in the pre-operative physical examination, haematological test, X-ray test and ECG. After arriving in the operation room, the ECG, non-invasive blood pressure (NIBP), pulse oximeter, and end tidal CO₂ were attached to the patient. She was premedicated with Inj glycopyrrolate 0.2 mg i.v., Inj ondansetron 4 mg i.v. and Inj fentanyl 50 µg i.v. Anaesthesia was induced with Inj thiopentone 300 mg i.v. and intubation was done after giving Inj vecuronium 7 mg i.v. and a 7.5 mm ETT (O) cuffed was secured. Anaesthesia was maintained with oxygen, nitrous oxide and isoflurane. The patient was placed in lithotomy position and a 50 mg diclofenac sodium pessary was placed per rectally. A reverse trendelenburg position was given after insufflations of the abdominal cavity. Suddenly the patient desaturated (SpO₂ fell from 99% to 60% to 45%) bradycardia (HR of 20/min) and the blood pressure was not recordable. EtCO₂ at this point was 12 mm of Hg and declining. She was noticed to have facial puffiness (Fig. 1). Progressively she developed erythema and urticaria of whole of the body with multiple ronchi on auscultation. Immediately the table was levelled up and CPR performed. She was ventilated with 100% oxygen and given Inj hydrocortisone 200 mg i.v. Inj adrenaline 1 ml of 1:1000 i.v. (given 3 times). Rapid infusion of 1 L of crystalloid was given. Her blood pressures came back to 90/60 mm of Hg, HR 62/min with EtCO₂ of 28 mm of Hg. Her blood pressure and HR kept fluctuating. Inj adrenaline was started 0.1 µg/kg/hour with Inj dopamine 5 µg/kg/hour. She was put on ventilatory support on P-SIMV mode with FiO₂ of 0.5, pressure support of 15 cm of water, PEEP of 5 cm of water. The infusions were tapered off within the next 24 h. She was taken off from ventilatory support by next afternoon 1300 h and discharged from

* Corresponding author. Tel.: +91 8105425508.

E-mail address: parliravi@gmail.com (P.R. Ravi).

0377-1237/\$ – see front matter © 2013, Armed Forces Medical Services (AFMS). All rights reserved.

<http://dx.doi.org/10.1016/j.mjafi.2013.10.010>

Fig. 1 – Periorbital oedema.

hospital on 4th day after the event. After discharge, an intra-dermal skin test was performed for the medications administered. Histamine was taken as a positive control while a saline solution was used as the negative control; 0.03 ml of each test substance was injected on the back of the patient with a hypodermic needle in the form of a clinically used solution diluted at ratio of 1:10, 1:100, and 1:1000 from a stock solution. Twenty minutes after the injection, the size of any wheal was measured. The criterion of positivity to an intra-dermal skin test is the mean diameter of the measured injection papule being larger than the diameter of the wheal induced by the positive control solution or twice than that of the bleb produced by the first injection. The test was stopped every time a positive reaction occurred at a lowest density level. Among the medications used to induce anaesthesia on the operation day, vecuronium showed a positive reaction in a 1/100 dilution. The preparation of vecuronium used was vial of 4 mg without additive. The tests with the other drugs showed negative reaction (Table 1). Intra-dermal test for latex sensitivity was not done.

Case 2

A 24-year-old female patient was admitted for emergency laparoscopic salpingectomy for ectopic pregnancy with no significant medical history of chronic illness or history of allergy to medications and food and neither family history of allergies. There were no abnormalities in the preoperative physical examination, haematological test and ECG. After arriving in the operation room, the ECG, NIBP, pulse oximeter, and end tidal CO₂ were attached to the patient. She was pre-medicated with Inj glycopyrrolate 0.2 mg i.v, Inj ondansetron 4 mg i.v, Inj fentanyl 100 µg i.v. and Inj diclofenac sodium 75 mg i.v. After pre-oxygenation with 100% oxygen for 3 min anaesthesia was induced with Inj thiopentone 300 mg i.v and rapid sequence intubation was done with Inj succinylcholine 100 mg i.v and a 7.5 mm ETT (O) cuffed was secured. She was given Inj vecuronium 5 mg i.v and anaesthesia was maintained with oxygen, nitrous oxide and isoflurane. The patient was placed in lithotomy position. Twenty minutes into

Table 1 – Intra-dermal skin test.

Drug	1:1000	1:100	1:10	1:1
Scoline (50 mg/ml)	5.5/5.5	6/6.5	7/7	7/7
Vecuronium (1 mg/ml)	6/6	6/9.5 ^a	6/8	6/10 ^a
Fentanyl (50 µg/ml)	5.5/6	7/7	7/7	6/6
Midazolam (1 mg/ml)	7/7	6/6.5	6/6	6/7
Voveran (25 mg/ml)	7/7	6/7.5	7/7	5/6
Glycopyrrolate (1 mg/ml)	5.5/6	6/6.5	6/6	6/6
Thiopentone (25 mg/ml)	6/6	7/7	5.5/6	6.5/7
Ceftriaxone (10 mg/ml)	7/7	6/6.5	6.5/6	7/6.5

A/B, where A: Skin wheal size before the intra-dermal dose, B: Skin wheal size 20 min after the intra-dermal dose.

^a Positive test.

surgery the patient developed bradycardia (HR 74–60–40–20/min), sudden drop in blood pressure (3 min interval BP not recordable), sudden fall in EtCO₂ with sudden appearance of urticarial rash all over the body with facial puffiness and multiple rhochis all over the lung field (Fig. 2). Immediately the table was levelled up and CPR was performed. She was given Inj hydrocortisone 200 mg i.v. Inj adrenaline 1 ml of 1:1000 i.v (given 2 times) and infusion of Inj dopamine 5 µg/kg/min and Inj adrenaline 0.1 µg/kg/min was started. Rapid infusion of 1 L of crystalloid was given. Her blood pressures came back to 90/60 mm of Hg, HR 72/min with EtCO₂ of 28 mm of Hg. The surgery was converted to open salpingectomy. She was ventilated overnight on P-SIMV mode with FiO₂ of 0.4, pressure support of 15 cm of water and PEEP of 5 cm of water. Both the infusions were tapered off by early morning hours. She was extubated next morning and was discharged on 5th post

Fig. 2 – Periorbital oedema with facial puffiness.

operative day. An inter-dermal test showed positive result for vecuronium. The preparation of vecuronium used was vial of 4 mg without additive.

Discussion

Anaphylaxis may be defined as a severe, allergic reaction involving the whole body. It is a type 1 hypersensitivity reaction resulting from the release of vasomotor substances, such as histamine, leukotriene, etc., which are activated by mast cells or basophilic cells via the mediators of immunoglobulin E (IgE). The prevalence of anaphylactic reactions under general anaesthesia varies from 1:1250 to 1:13,000.^{1–3} The clinical symptoms of anaphylactic reactions are difficult to differentiate from anaphylactoid reactions and the distinction was reformulated in recent terminology as immunologic anaphylaxis vs. non-immunologic anaphylaxis.⁴ The mortality rates for anaphylaxis are 3–6% and the frequency of severe neurological damage is 2%.⁵ Most common agents which are responsible for intra-operative anaphylaxis are morphine and almost all muscular agents, in following proportion (succinylcholine 43%, vecuronium 37%, pancuronium 13%, alcuronium 76%, atracurium 6.8%, galamine 56%).³

The clinical features involve the following: cardiovascular collapse, such as hypotension, tachycardia, or bradycardia; complications of the respiratory system, such as bronchospasm, pulmonary oedema, and hypoxia; and skin reactions, such as systemic lupus erythematosus and oedema, etc. Vascular oedema is a skin change resulting from skin vasodilatation and an increase in vessel wall permeability. The transition of a large amount of fluid and the mucosal oedema in the pharynx, larynx, trachea, etc. causes an obstruction of the upper airway. An increase in exudates can lead to hypovolemic shock.^{5,6}

The episode of anaphylaxis in our patient was identified with the concurrence of facial oedema, airway resistance, bronchospasm like a change in the end tidal CO₂ curve, and cardiovascular reactions. It is advisable to terminate the operation as soon as anaphylaxis is recognised and discontinue any medications as we did in our first case. In our second case although the patient condition was critical the indication for surgery made us to continue the surgery along with stabilisation of patient. No antihistamines were given in both the cases as it has not been shown to be effective in episode of anaphylaxis.^{7–9}

Anaphylaxis can occur as a result of any medication used during anaesthesia, among which 60% of cases are connected to muscle relaxants, 20% to latexes, 15% to antibiotics, and the rest 5% to sleeping pills, colloids, opioid etc.¹⁰ Bromine found in isoflurane and iodine which detoxes bromide can also be the cause anaphylaxis under anaesthesia. Certain group of individuals (atopic, increased exposure to latex, patients undergoing recurrent surgeries or repeated bladder catheterisation) are at high risk of developing such reactions. The diagnosis of anaphylaxis while its reaction is active includes the measurement of tryptase, histamine, complement or IgE, skin prick test, intra-dermal skin test, etc. An intra-dermal skin test has high sensitivity with a low false-negativity rate and is regarded as a critical criteria of diagnosis for allergic

reactions that develop during operation.^{11,12} We were not able to test both the patients for latex sensitivity because non-availability of the test.

Conclusion

Providing the proper treatment in the event of anaphylaxis is important but pre-treatment to prevent exposure to its inducers is much more important. It is practically impossible to perform a skin test on every medication administered during anaesthesia for every patient.^{9,10} The diagnosis of anaphylactic reactions is difficult to make during the induction of anaesthesia when various types of medication are used simultaneously. Therefore, it is mandatory to make a prompt diagnosis, and to provide a proper treatment for its occurrence. In our cases the responsible agent was identified using the intra-dermal skin test, which has higher sensitivity than other diagnostic methods.

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Dong SW, Mertes PM, Peptitpain N, Hasdenteufel F, Malinovsky JM. Hypersensitivity reactions in the anaesthesia setting/allergic reactions to anaesthetics. *Minerva Anesthesiol.* 2012 Aug;78(8):868–878.
2. Brereton A, Russel WJ. Anaphylaxis to muscle relaxants: an audit of ten years of allergy testing at Royal Adelaide Hospital. *Anaesth Intensive Care.* 2012 Sep;40(5):861–866.
3. Mertes PM, Demoly P, Malinovsky JM. Hypersensitivity reactions in the anaesthesia setting/allergic reactions to anaesthetics. *Curr Opin Allergy Clin Immunol.* 2012 Aug;12(4):361–368.
4. Mertes PM, Laxenaire MC, Lienhart A, et al. Reducing the risk of anaphylaxis during anaesthesia: guidelines for clinical practice. *J Investig Allergol Clin Immunol.* 2005;15:91–101.
5. Nitti Joseph T. Anesthetic complications. In: Morgan Jr GE, Maged SM, Michael JM, eds. *Clinical Anesthesiology*. 5th ed. USA: McGraw-Hill; 2010:970–973.
6. Mertes PM, Laxenaire MC, Alla F. Anaphylactic and anaphylactoid reactions occurring during anaesthesia in France in 1999–2000. *Anesthesiology.* 2003;99:536–554.
7. Lieberman P. Anaphylactic reactions during surgical and medical procedures. *J Allergy Clin Immunol.* 2002; 110(suppl 2):S64–S69.
8. Porri F, Lemiere C, Birnbaum J, et al. Prevalence of muscle relaxant sensitivity in a general population: implications for a preoperative screening. *Clin Exp Allergy.* 2009;49:72–75.
9. Dybendal T, Guttormsen AB, Elsayed S, Askeland B, Harboe T, Florvaag E. Screening for mast cell tryptase and serum IgE antibodies in 18 patients with anaphylactic shock during general anaesthesia. *Acta Anaesthesiol Scand.* 2003 Nov;47(10):1211–1218.
10. Hwang Sung Mi, Suh Jung Wook, Lim So Young. Anaphylaxis after thiopental and rocuronium induction. *Korean J Anesthesiol.* 2005;48:95–98.

11. Ebo DG, Hagendorens MM, Bridts CH, De Clerck LS, Stevens WJ. Scandinavian clinical practice guidelines on the diagnosis, management and follow-up of anaphylaxis during anaesthesia: some diagnostic issues. *Acta Anaesthesiol Scand*. 2010;58:314–315.
12. Dhonneur G, Combes X, Chassard D, Merle JC. Skin sensitivity to rocuronium and vecuronium: a randomized controlled prick testing study in healthy volunteers. *Anesth Analg*. 2004 Apr;98(4):986–989.