SHORT REPORT

Latex allergy on anaesthesiologist and anaesthesia managements: Are the health workers high risk patients?

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Abstract

Anaphylaxis is defined as a severe, life threating, generalized or systemic hypersensitivity reaction. The most common agent involved in intraoperative anaphylactic reactions is muscle relaxant (61-70%); natural rubber latex (NRL) is the second most implicated agent and the incidence of latex-related anaphylactic reactions is increasing despite increasing awareness and preventive measures taken. Latex is a ubiquitous part of life today. Medical products which contain latex are present in our environment, especially in the hospital setting.

This study focuses on our experience with two different anaesthetic techniques performed on the same patient who had latex hypersensitivity reaction and underwent surgery for myomectomy twice in 5 years. This case report aims to point out to latex hypersensitivity on health workers. The patient described had latex allergy and strategy of management during perioperative period is detailed.

Keywords: Anaesthesia complication, Intaoperative anaphylaxis, Latex allergy.

Introduction

During general anaesthesia many cases of latex anaphylaxis were seen in the 1980s. This problem has increased the health concern about latex allergy.[1]

The incidence of latex sensitization in general population is about 1:100, and some groups at high risk have been identified such as patients with spina bifida and/or urogenital abnormalities, health workers and patients with a history of multiple surgical procedures or allergies to fruits. Sensitization to latex is more frequent in women and a common setting for latex anaphylaxis may be obstetric and gynaecological surgery.[2]

In this article we explained our experience with two different anaesthetic techniques performed on the same patient who had latex hypersensitivity reaction and had undergone myomectomy operation twice in 5 years. By this report we also wanted to attract attention to latex hypersensitivity on health workers.

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Patient Report

First Operation

The patient was a 39-year-old anaesthetist of 160 cm height and 58 kg weight. We planned to perform spinal anaesthesia for myomectomy operation. Preoperative haemogram and biochemical parameters were normal and no systemic disease was mentioned which had contraindication for spinal anaesthesia. In her history, she described itching and redness on hands and coughing due to use of powdered gloves. She mentioned none of those complaints when she used powder-free gloves. She also described rare coughing accompanied by respiratory distress when she frequently needed to use powdered gloves during the day. She did not refer to any symptoms that would indicate latex allergy. However, she mentioned about the increase of hyperaemia and pruritis by use of surgery gloves, and also difficulty while breathing when she worked for long hours in the surgery room. It was also stated that salbutamol inhalation was effective on the patient for better breathing and so we thought of asthma. After premedication with 1 mg midazolam; EKG, blood pressure and SpO_2 were monitorised, and preoperative values were noted as HR 75/min, BP 110/70mmHg, SpO_2 98%. For liquid replacement 500cc 0.9% NaCl was used and after this step, the patient was placed in lateral decubitus position. Spinal puncture was made between L3-4 interspinal space with a 27 G spinal needle and 3cc (15mg) marcaine heavy was injected into the subarachnoid space. At the 15th minute of anaesthesia, block level reached T5-6 and haemodynamic measurements stayed stable., The block level reached T4 at the 20th minute when surgery was started. At the beginning of the operation the haemodynamic and respiratory parameters were stable and stayed the same until 20 minutes later. When the surgical team started manipulation of the uterus and pelvic tissues, coughing and mild dyspnoea began. At the same time hyperaemia of the upper extremities was observed and the patient complained of nasal congestion. Dyspnoea gradually

increased, and coughing, wheezing and cyanoses appeared. Despite nasal oxygen and salbutamol inhalation, cyanoses continued to increase and so positive pressure ventilation (PPV) with a mask was initiated. Due to increasing bronchospasm and decreasing SpO2 to 50%, the patient was intubated with 150mg propofol and 1mg/kg rocuronium. Following intubation, the severe bronchospasm continued and no respiratory sounds were heard on auscultation, so 100mg Prednisolon and 240mg Aminophylline infusion was started. After severe cyanoses (SpO2 30%), the blood pressure decreased (60/30mmHg) and also bradiarythmia (40/min) developed. A large amount of secretions filled in the endotracheal tube and this led to the diagnosis of a developing anaphylactic reaction. Adrenalin 0.1mg dissolved in 10 cc SF and 0.5mg IV atropine was injected. After adrenaline injection, respiration was resumed and expansion of chest was observed. During this process, the surgical team irrigated the abdominal cavity with normal saline and stopped the surgery for some time.

Simultaneously 500mg colloid was rapidly infused. The secretions in the tube were continuously aspirated and the heart rate, blood pressure, SpO_2 values started to improve. When haemodynamic, and respiratory parameters and blood gas values were normalized; the operation was resumed under general anaesthesia. At the end of surgery the patient was taken into the post anaesthesia care unit (PACU) and extubated. On 3rd postoperative day the patient was sent home without any complications. Taking the anaphylactic reaction to be due to the use of powdered gloves, latex allergy was not considered. The patient was examined in the allergy clinic in the postoperative period and latex allergy was confirmed by the "prick test".

Second Operation

Five years after the first operation, a new myomectomy surgery was planned for the same patient because of the enlarging myoma. The patient was diagnosed with both powder and latex allergy by tests performed in allergy immunology clinic following the first operation. She did not mention any of the previous allergic symptoms in the intervening period as she used latex-free and powder-free gloves. She therefore arranged for latex-free equipment such as anaesthesia circuits, masks, intubation tubes required for anaesthesia procedure and other interventions.

Haemogram and biochemical parameters were normal and "combined spinal epidural anaesthesia" (CSEA) technique was planned for anaesthesia. During preoperative period as a result of allergy and immunology consultation 40mg Prednisotone was given 13 hours, 7 hours and 1 hour before the operation, and 45.5mg Pheniramine Maleate (avil injectable) was injected intravenously as an antihistaminic agent. All equipment including latex were taken away from the surgery room and the room was well ventilated to avoid inhalation of any allergen the night before the operation.

The patient was admitted to the surgery room as the first case. All of the surgery room workers (doctors, nurses, and others) used latex-free and powder free gloves. All the equipment (such as branules, serum sets, injectors, EKG electrodes, CSEA sets, urine sets and drains) used during the surgery contained no latex. After premedication with 1 mg midazolam; EKG, blood pressure and SpO_2 were monitored, and preoperative values were noted as HR 80/min, BP 115/75mmHg and SpO_2 98%. For liquid replacement 500 cc 0.9% NaCl was used and after this step, the patient was placed in lateral decubitus position and CSEA technique used between L3-4 space. After injection of 15mg (3 ml) heavy Marcaine into the subarachnoid space, 3cm of epidural catheter was placed into epidural space. When block reached T4-5 level, the operation was started. During operation haemodynamic and respiratory parameters stayed at normal levels. In the postoperative period, morphine infusion was applied through epidural catheter by "patient controlled analgesia" technique. The patient had no problems in the perioperative and postoperative period and was sent home on the second postoperative day.

Discussion

The incidence of anaphylaxis during anaesthesia has been estimated to be between 1 in 10,000 to 1 in 20,000. The most frequent causes of anaesthesia-related anaphylactic reactions are muscle relaxants (60%), antibiotics (15%) and intravenous colloids (5%). The incidence of latex-induced anaphylaxis appears to decline and chlorhexidine-induced anaphylaxis appears to be more frequent. Aspirin, non-steroidal anti-inflammatory drugs, induction agents, opiates, aprotinin, protamine, oxytocin, chlorhexidine, radiological contrast media, dyes (Patent Blue V) and bone cement have been implicated in anaphylactic reactions.[3]

Latex reactions are divided into three main categories:

- Hev proteins found within natural rubber latex cause type I (IgE mediated) hypersensitivity reaction and allergic anaphylaxis. There is a degree of cross-sensitivity between Hev proteins and certain fruits (banana, chestnut, avocado).

- Additives used during rubber production may also cause

contact dermatitis. This type IV hypersensitivity reaction manifests as an eczematous reaction and may predispose the individual to a more serious systemic reaction.

- A non-immune mediated dermatitis can also occur in response to the irritant effect of powder on the gloves, moisture and detergents.[3]

The onset of latex anaphylaxis in the operating room occurs 25-290 min after induction of anaesthesia, when latex gloves directly make contact with large surface areas within a body cavity (e.g., peritoneal, thoracic).[4] In our case during the first operation, 20-25 min after the opening of abdomen, dyspnoea, nasal congestion and hyperaemia started soon after touching the uterus and pelvic tissues by powdered and latex gloves. By the time dyspnoea increased, coughing, wheezing and cyanoses appeared.

Powder is applied on the inner surface of latex gloves for ease of wearing them. Powder along with latex molecules bonds latex molecules strongly to the tissue, an important cause of allergy. Latex free and powder free gloves are therefore recommended.[5-7]

As there are no characteristic symptoms of latex allergy in anaesthetized patient, an anaphylactic reaction is the most probable causative factor and should be considered in the differential diagnosis.

The clinical severity of immediate hypersensitivity reactions in the perioperative period have been graded (Table).[8]

To prevent latex reaction it is better not to use latex products from birth. Today many hospitals have become latex-free.[9] The quantity of latex aeroallergens measured in the operating room after using latex versus non-latex gloves follows the order: powdered latex gloves > powder-free latex gloves > non-latex gloves, where the substitution of powder-free for powdered latex gloves reduced the aeroallergen concentration of latex by 10-20-fold.[10]

Table: Severity Grade For Anaphylaxis.

Grade I: Generalized cutaneous signs: erythema, urticaria with or without angioedema.
Grade II: Moderate multi-organ involvement with cutaneous signs, hypotension, tachycardia, or bradycardia, bronchial hyper-reactivity (cough, ventilatory impairment)
Grade III: Severe life-threatening multi-organ involvement that requires specific treatment: collapse, tachycardia, or bradycardia, cardiac arrhythmias, bronchospasm; the cutaneous signs may be absent or occur only after the arterial blood pressure recovers.
Grade IV: Circulatory or respiratory arrest
Grade V: Death due to a lack of response to cardiorespiratory resuscitation.

When preparing surgical equipment, non-latex gloves should be used. Before the operation, warning signs about latex allergy should be put on all doors leading to the operating room. To protect susceptible patients from latex reactions, pharmacologic prophylaxis with antihistamines (H1 and H2 blocking agents) and steroids is recommended by some experts. Despite all these measures, allergic reactions have still been reported.[1]

To diagnose latex hypersensitivity, there should be a detailed history of patient, including clinical signs and symptoms of an allergic reaction to latex, as well as an evidence of latex sensitization based on serum (in vitro) and/or skin (in vivo) tests. Skin prick testing with standardized commercial latex extracts is used to diagnose latex hypersensitivity in Europe, but in United States mainly in vitro tests are used. In some cases skin prick tests are also used through latex gloves.[11]

The response of the skin of the patient is examined by means of the skin prick test. A small and diluted amount of latex protein solution is placed on the skin by pricking this site of skin. Skin prick test is performed through a latex glove in the United States. Usually 4-6 weeks after the reaction, skin prick test is performed. Within approximately 15 min a small raised area surrounded by hyperaemia occurs on the test site if there is an allergic reaction to latex on the patient. The sensitivity and sensitivity of this test is nearly 100%.[12]

Currently many institutions use either powder-free or latex-free gloves in operating rooms to reduce the risk of reactions to latex exposure. Today many of the new ventilators, anaesthetics machines, and equipment including masks and tubes are produced NRL-free.[9,10] It is suggested that during mechanical ventilation, to reduce the risk of NRL exposure to the patient, a filter (BB25; Pall Corporation, Port Washington, NY) can be placed into the breathing circuit, if the internal parts of an anaesthetic machine contains latex.[13]

The patients with significantly high risk of allergic reaction to latex are;[14]

1) Patients having repeated bladder catheterization; as children with urogenital malformations or neural tube defects and spina bifida patients.

2) Health workers; mainly nurses in surgery.

3) Patients who are exposed to latex because of their occupation.

4) Patients who have a history of atopy, in particular those with dermatitis, hay fever, asthma, or food allergy to fruits such as bananas, avocados or kiwis: In the non-atopic

population the latex allergy prevalence is <1%, whereas 57% of patients with latex allergy have an atopic history.

5) Patients with history of anaphylaxis with unknown etiology, especially during previous surgery, hospitalizations or dental visits.

6) Females, generally, seem to be more liable to develop latex allergy than males. This may be a result of an increased genetic susceptibility, occupational exposure, or greater mucosal contact with latex barrier contraceptives and routine examination during gynaecological and obstetric procedures.

The usage of products (materials) containing latex in operating rooms is increasing day by day; however, some of the materials do not have stickers on stating whether it is containing latex or not. This is a life-threatening situation especially for the patients who have latex hypersensitivity reaction. During preoperative assessment all the patients must be asked if they have any of the symptoms like rhinitis, pruritus, conjunctivitis, wheezing, hypotension, laryngeal oedema, or oedema on face when they are exposed to any drug or material (gloves, balloons, nipple, sport materials, etc.). The occupation of the patient is important as chronic exposure to latex material as in operating rooms increase the risk of reaction.[15]

Because the latex particles hang in room air for 1 hour, we well ventilated the operation room for our patient, took away all equipment including latex material out of the room and we also accepted our patient at the first order in the morning for the second operation. Furthermore, we used latex-free materials during anaesthesia. All the surgeons and anaesthesia team used gloves without latex. There was no material with latex in the operating room.

It is known that using H1, H2 antagonists and steroids for pharmacological prophylaxis preoperatively do not prevent the anaphylactic reaction. Effective prophylaxis is ventilation of the operation room and providing latex free rooms.[16]

Conclusion

A high index of suspicion is necessary for latex allergy if the concerned person is a health worker with an occupation in the operating room and has had allergy symptoms in the past. If this subject needs surgery, a latex free environment should be provided to prevent anaphylaxis.

References

1. Gold M, Swartz JS, Braude BM, Dolovich J, Shandling B, Gilmour RF. Intraoperative anaphylaxis: An association with latex sensitivity. J Allergy Clin Immunol 1991; 87: 662-6.
2. Lieberman P. Anaphylactic reactions during surgical and medical procedures. J Allergy Clin Immunol 2002; 110: S64-9.
3. Carle C, Harper JNN. Anaphylactic reactions associated with anaesthesia. Anaesthesia and Intensive Care Medicine 2010; 11: 391-3.
4. Murat I. Anaphylactic reactions during paediatric anaesthesia; results of a survey of the French Society of Paediatric Anaesthestists (ADARPEF) 1991-1992. Paediatr Anaesth 1993; 3: 339-43.
5. Malerich PG, Wilson LM, Mowad CM. The effect of a powder-free latex gloves on workers' compensation claims for latex-related illness. Dermatitis 2008; 19: 316-8.
6. Tomazic VJ, Shampaine EL, Lamanna A, Withrow TJ, Adkinson NF, Hamilton RG. Cornstarch powder on latex products is an allergen carrier. J Allergy Clin Immunol 1994; 93: 751-8.
7. Yunginger JW, Jones RT, Fransway AF, Kelso JM, Warner MA, Hunt LW. Extractable latex allergens and proteins in disposable medical gloves and other rubber products. J Allergy Clin Immunol 1994; 93: 836-42.
8. Kroigaard M, Garvey LH, Gillberg L, Johansson SG, Mosbeech H, Florvaag E, et al. Scandinavian Clinical Practice Guidelines on the diagnosis, management and follow-up of anaphylaxis during anaesthesia. Acta Anaesthesiol Scand 2007; 51: 655-70.
9. Jackson EM, Arnette JA, Martin ML, Tahir WM, Frost-Arner L, Edlich RF. A global inventory of hospitals using powder-free gloves: A search for principled medical leadership. J Emerg Med 2000; 18: 241-6.
10. Heilman DK, Jones RT, Swanson MC, Yunginger JW. A prospective, controlled study showing that rubber gloves are the major contributor to latex aeroallergen levels in the operating room. J Allergy Clin Immunol 1996; 98: 325-30.
11. Sampathi V, Lerman J. Case Scenario: Perioperative Latex allergy in children. Anesthesiol 2001; 114: 673-80.
12. Kelly KJ, Kurup V, Zacharisen M, Resnick A, Fink JN. Skin and serologic testing in the diagnosis of latex allergy. J Allergy Clin Immunol 1993; 91: 1140-5.
13. Barbara J, Santais MC, Levy DA, Ruff F, Leynadier F. Prevention of latex sensitization in guinea pigs by a bacterial and viral filter used in anaesthesia. Br J Anaesth 2005; 95: 349-54.
14. Dakin MJ, Yentis SM. Latex allergy: a strategy for management. Anaesthesia, 1998; 53: 774-81.
15. Bouaziz H, Laxenaire MC. Anaesthesia for allergic patient. Curr Opin Anaesthesiol 1998; 11: 339-44.
16. Setlock MA, Cotter TP, Rosner D. Latex allergy: Failure of prophylaxis to prevent severe reaction. Anesth Analg 1993; 76: 650-3.