J Korean Surg Soc 2011;81:S30-33
http://dx.doi.org/10.4174/jkss.2011.81.Suppl1.S30

JKSS
Journal of the Korean Surgical Society

pISSN 2233-7903 · eISSN 2093-0488

CASE REPORT

A case of anaphylactic shock attributed to latex allergy during gastric cancer surgery

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Latex allergy is a known cause of allergic contact dermatitis. It produces mild symptoms, including skin rash and itching, which usually subside in a few days. However, latex allergy can also induce anaphylaxis, a severe type I hypersensitivity reaction that can cause urticaria, angioedema, hypotension, tachycardia, and bronchospasm. We report a case of anaphylactic shock during gastric cancer surgery in a patient with no previous allergic history. Surgery was suspended when hypotension, tachycardia, and wheezing developed. A thorough workup revealed that the patient had a latex allergy. The patient subsequently underwent curative gastrectomy performed with latex-free procedures.

Key Words: Surgery, Latex hypersensitivity, Anaphylaxis

INTRODUCTION

Anaphylactoid symptoms commonly occur during surgery under general anesthesia. Most symptoms are mild, but severe symptoms can occur, including hypotension, bronchospasm, and cardiac arrest. Although the major causes are anesthetic drugs, such as neuromuscular blocking agents (NMBAs), latex allergy causes severe symptoms in 12 to 16% of occurrences [1,2]. Anaphylactic shock refers to the anaphylaxis associated with systemic vasodilation, resulting in low blood pressure, and is also associated with severe bronchoconstriction. We present a case of anaphylactic shock attributed to latex allergy during gastric cancer surgery.

CASE REPORT

A 68-year-old man complained of epigastric discomfort and nausea for one month. Because the symptoms persisted, he visited a local clinic and stomach cancer was diagnosed by esophagogastroduodenoscopy. He had histories of both hearing impairment after acupuncture in childhood and appendectomy from several decades earlier. Esophagogastroduodenoscopy revealed a 2 cm early gastric cancer in the upper third of the anterior wall. A colonoscopy revealed a 0.3 cm sized, 3 cm polyp 20 cm above the anal verge and a polypectomy was performed after its detection. Computed tomography revealed no metastatic lesion.

The operation was performed as usual. Midazolam (2

Received March 31, 2011, Revised May 1, 2011, Accepted May 2, 2011

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mg) was injected as the preanesthetic agent, O_2 was supplied through a facial mask, and the anesthetist induced anesthesia after a lidocaine (30 mg) injection. Lidocaine was used to reduce the pain of the anesthetic agent. After the infusion of remifentanyl (3 μg/mL) and propofol (4 μg/mL), and the injection of rocuronium (40 mg), endotracheal intubation was performed with a 7.5 French endotracheal tube. Then, a 16 French Foley catheter was inserted into the urethra and the surgeon incised the upper midline. After 10 minutes, the patient's oxygen saturation decreased from 100 to 81%, his blood pressure decreased from 115/81 to 50/36 mmHg, and his heart rate increased from 81 to 130 beats/min. Ephedrine (10 mg) and phenylephrine were injected twice. However, the patient's blood pressure was not restored to a normal level. Crackle and wheezing could be heard in both lung fields, so ventolin inhalation was administered. Endotracheal tube suction was applied, and a large amount of a whitish secretion was removed. To treat the patient's hypotension, norepinephrine and dopamine were infused and epinephrine (0.2 mg) was injected subcutaneously. To rule out cardiogenic shock, we performed transesophageal echocardiography at his bedside. However, his cardiac function was good. After the patient's vital signs had recovered, he was transferred to the intensive care unit, where his oxygen saturation increased to 100%, his blood pressure was 100/64 mmHg, and his heart rate was 125 beats/min.

A skin test was performed to establish the cause of the patient's response. It revealed a weak positive reaction to rocuronium (NMBA), three positive reactions to latex (glove, Foley catheter, surgical instruments), and a negative reaction to cefazolin (prophylactic antibiotic). Therefore, the cause of his intraoperative anaphylaxis was latex, although NMBA could not be ruled out. After the patient had recovered, the operation was resumed, but with consideration of his latex allergy. Intravenous methyldopa (30 mg twice a day), and injected chlorpheniramine (45.5 mg once a day) and ranitidine (50 mg once a day) were administered. The anesthetist used atracurium (1 mg) instead of rocuronium, which was injected intravenously, after which the patient was observed for 10 minutes. Because his vital signs did not change, the anesthetist injected a further 49 mg of atracurium. Latex-free surgical instruments were prepared in the operating room. The staff used latex-free gloves and silicon tubes. No other latex-containing equipment, such as wound protectors, irrigation syringes, tourniquets, or elastic bands, were used. A total gastrectomy with a Roux-en-Y esophagojejunostomy was performed without problems. The pathological result was a T2aN1 tumor, according to the American Joint Committee on Cancer cancer staging manual, 6th Edition. Although adjuvant chemotherapy was recommended, the patient rejected it and has since been followed-up in our outpatient department.

DISCUSSION

Natural rubber latex (NRL) is a product made from the *Hevea brasilensis* tree. Various latex goods are treated with the production process called "vulcanization". Among the many components of latex, the protein hevein is the antigen that causes latex allergy. Specifically, heveins b1 and 3 are the antigens that affect patients with spina bifida or a congenital urogenic deformity, and heveins b5, 6, and 7 are the antigens that affect workers in the healthcare industry [3].

Latex allergy is known as a type IV hypersensitivity reaction, causing contact dermatitis. It is mediated by T lymphocytes and causes eczema on the skin, a mild symptom of latex allergy. However, latex allergy also causes severe symptoms via an immunoglobulin E (IgE)-mediated reaction. The allergen stimulates B lymphocytes, which produce a specific IgE that attaches firmly to mast cells. Mast cells release their vesicular contents, such as histamine, ECF-A, NCF-A, leukotrienes, prostaglandins, kinins, and PAF, and these vesicular contents cause increased capillary permeability, bronchospasm, and vasodilation. These are the reactions of type I hypersensitivity, collectively called "anaphylaxis". These symptoms vary from mild (pruritus, nasal discharge, nasal congestion, cough) to severe (hypotension, bronchospasm, asthma).

High-risk groups include those who have frequent contact with latex products, such as healthcare workers, garbage collectors, hairdressers, rubber industry workers, food handlers, restaurant workers, domestic workers, se-

curity personnel, construction workers, greenhouse workers, gardeners, painters, police officers, firefighters, and ambulance attendants. Other high-risk groups are those patients with spina bifida (16.7%), meningomyelocele (13.6%), and with congenital urogenital anomalies requiring multiple surgical operations from early age. The sensitizing pathways include exposure to latex of the skin, mucus membrane, intravenous line, sprayed water. Certain tropical fruits, including banana, avocado, salary, pear, kiwi, tomato, and potato, and other plant foods can trigger allergic cross-reactions in patients with NRL allergy, because they contain antigens structurally similar to the hevein b allergen, and so may trigger cross-sensitization [2-5].

The diagnostic tools used for IgE-mediated latex allergy include history assessment, skin test, provocation test, and serological test. The skin test is simple and sensitive (sensitivity, 99%). For example, an intradermal test involves injecting the allergen using a tuberculin syringe. A reactive wheal and flare is a positive result. However, anaphylaxis may be triggered by the skin test, so the test must be executed in a place in which cardiopulmonary resuscitation is available. The serological test is based on an antigen-antibody reaction, in which the antigen in the sampled serum combines with a labeled monoclonal IgE antibody. The sensitivity of the test is 53%, which is lower than that of the skin test.

Coping with an allergic reaction is not ruling out allergic reaction until coming out into the open. Because symptoms such as a rapid change in blood pressure, tachycardia, and wheezing are rare without considerable blood loss or anesthetic use in the operating room, several possibilities must be considered, especially an allergic reaction. After an allergic reaction, the instruments potentially responsible must be removed and administration of all antibiotics, blood products, and anesthetics must be terminated, and O_2 must be supplied, with intubation if necessary. If the patient is hypotensive, fluid resuscitation and epinephrine should be given as necessary. Corticosteroid should then be given, and if bronchospasm is suspected, aminophylline or a β-agonist must be administered [2-5].

The preoperative management of a latex allergy or a suspected latex allergy involves dimenhydramine (1 mg/kg four times a day), ranitidine (2 mg/kg three a day), and hydrocortisone (5 mg/kg four times a day) given from one hour before surgery to one day after the operation. Currently, several attempts to develop a specific allergen immunotherapy for latex allergy have been effective in symptomatic improvement, but some patients have experienced a systemic reaction during therapy [6].

Table 1. Latex surgical products

Latex surgical products
Airways, including masks
Ambu bag
Band-aids
Blood pressure cuff
Condom catheter
Dressings
Elastic bandage
Electrode pads
Endotracheal tubes
Foley catheter
Gloves
Intravenous bag
Penrose drain
Rectal catheter
Stethoscope tube
Suction catheter
Syringe
Tourniquet

The best management technique is prevention, and the best preventive measure is avoidance. Latex goods have been produced since the late 19th century, and today, diverse latex products are used extensively. Some common surgical latex products are listed in Table 1. Latex-free instruments must be used for patients suspected of latex allergy. More to the point, patients must themselves be conscious of their latex allergies, so that they can avoid latex products. In this way, they can protect themselves against latex allergy. They should also inform those around them of their allergy in case of emergency.

The patient reported here had no congenital deformity, such as spina bifida, and was not employed in a high-risk industry. However, in hospital, the patient may have been sensitized during the many procedures and tests performed. The anesthetist managed the intraoperative events of hypotension, wheezing, and tachycardia well. The cause of the intraoperative anaphylaxis was shown on a skin test

to be a latex allergy. However, the skin test was also weakly positive for rocuronium. NMBAs such as rocuronium occasionally cause allergic reactions during anesthesia, with succinylcholine and rocuronium the most frequently incriminated NMBAs. These have a direct vasodilatory effect on the skin and induce histamine and tryptase release from mast cells. Cross-reactivity between NMBAs has also been observed in cases of anaphylaxis to an NMBA. However, our patient was only injected with rocuronium during his first operation. When the operation was resumed, the anesthetist injected atracurium instead of rocuronium. Atracurium is derived from benzylisoquinoline, whereas rocuronium is derived from an aminosteroid. Although benzylisoquinoline-derived NMBAs have a higher propensity for allergy than aminosteroidal NMBAs, it is possible to use another affiliated NMBA if the selected NMBA triggers an allergic reaction. The anesthetist used a small dose initially, and administered the rest of the dose after a period of observation. There was no change in the patient's vital signs. Anaphylactic reactions induced by NMBAs can be prevented by the preanesthetic screening of patients at risk [7-9].

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Potério GM, Braga Ade F, Santos RM, Gomes Ide F, Luchetta MI. Anaphylaxis during renal transplantation of live donor graft in a child with latex allergy: case report. Rev Bras Anestesiol 2009;59:210-8.
2. Gerber AC, Jörg W, Zbinden S, Seger RA, Dangel PH. Severe intraoperative anaphylaxis to surgical gloves: latex allergy, an unfamiliar condition. Anesthesiology 1989;71:800-2.
3. Meade BJ, Weissman DN, Beezhold DH. Latex allergy: past and present. Int Immunopharmacol 2002;2:225-38.
4. Pollard RJ, Layon AJ. Latex allergy in the operating room: case report and a brief review of the literature. J Clin Anesth 1996;8:161-7.
5. Deval R, Ramesh V, Prasad GB, Jain AK. Natural rubber latex allergy. Indian J Dermatol Venereol Leprol 2008;74: 304-10.
6. Turjanmaa K, Alenius H, Reunala T, Palosuo T. Recent developments in latex allergy. Curr Opin Allergy Clin Immunol 2002;2:407-12.
7. Mertes PM, Moneret-Vautrin DA, Leynadier F, Laxenaire MC. Skin reactions to intradermal neuromuscular blocking agent injections: a randomized multicenter trial in healthy volunteers. Anesthesiology 2007;107:245-52.
8. Fisher MM, Merefield D, Baldo B. Failure to prevent an anaphylactic reaction to a second neuromuscular blocking drug during anaesthesia. Br J Anaesth 1999;82:770-3.
9. Haeberle HA, Lupic D, Midoro-Horiuti T, Kiefer RT, Schroeder TH, Unertl K, et al. Role of cross-allergies to latex in clinical routine of anesthesia. J Clin Anesth 2003;15: 495-504.