

Case Report

Wheezing Caused by Latex Allergy in a 25-Day-Old Infant with Atopic Dermatitis

HAJIME KIMATA, M.D., Ph.D.

ABSTRACT

We report a case of a 25-day-old male infant with episodic wheezing caused by latex allergy. Full-term male infant without anomaly was breast-fed for the first 7 days of life. Thereafter, he partly began bottle-feeding of conventional cow's-milk-based formula with a natural rubber nipple. At 14 days of life, the infant had noisy breathing upon bottle-feeding, but not upon breast-feeding. The mother switched the infant to a soy formula, which did not improve noisy breathing. The mother also used nipple composed of isoprene and natural rubber latex or nipple composed of silicone and natural rubber nipple, which was confirmed by manufacturer. The infant wheezed when fed with these nipples. Moreover, the infant had transient diarrhea and vomiting at 18 days of life, when the mother ate an apple and breast-fed him thereafter. Skin eczema appeared on the face and trunk at 21 days of life. Thus, the mother took the infant to our clinic. On presentation, his lungs were clear, and no heart murmurs were heard. Neither radiograph of chest nor ultrasound scans of heart or neck revealed any abnormality. Detailed study revealed that the infant was allergic to latex, extracts from rubber nipples, and apple, while he was not allergic to egg, cow's milk, soy, wheat, peanut, house dust mite, dog dander or cat dander. Thereafter, the mother breast-fed the infant without eating an apple, while she partly fed him with cow's milk-based formula by using plastic spoon. By 4 months of age, he was free from noisy breathing or eczema.

INTRODUCTION

PREVIOUS REPORTS have shown several cases of latex allergy in children, especially amongst those who have undergone multiple surgical procedures or have an atopic predisposition.¹⁻³ However, a few cases of latex allergy were reported in infants younger than 1 year old without surgical procedure. Latex pacifiers caused persistent cough in an 11-month-old infant with seborrheic dermatitis since the age of 3 months, while latex nipple caused episodic stridor and wheezing in a 2-month-old infant with atopic dermatitis since the age of 3 weeks.^{4,5} Here, we report a 25-day-old baby with atopic dermatitis, who had episodic wheezing caused by latex nipples. Detailed analysis of latex allergy in the infant and parents is discussed.

Department of Pediatrics and Allergy, Ujitakeda Hospital, Kyoto Prefecture, Japan.

CASE REPORT

A 25-day-old full-term male infant without anomaly was presented to our clinic for wheezing and eczema of the face and trunk. Neither of the parents of the infant were occupationally exposed to latex on a regular basis. He was breast-fed for the first 7 days of life without difficulty. After 8 days, in addition to breast-feeding, he began bottle-feeding of conventional cow's milk-based formula with a natural rubber latex nipple. The mother did not notice any abnormal symptoms until 14 days of life, when she noticed that the infant had noisy breathing upon bottle-feeding. The noisy breathing occurred after several minutes of feeding, and it resolved when bottle-feeding was over. In contrast, the mother did not notice any noisy breathing upon breast-feeding. The mother switched the infant to a soy formula, but episodic noisy breathing upon bottle-feeding continued. Then, the mother changed natural rubber nipple to nipple composed of isoprene and natural rubber latex, or to nipple composed of silicone and natural rubber nipple, which was confirmed by manufacturer (PIGEON Co. Ltd., Tokyo, Japan). However, the infant wheezed when fed with these nipples, which was reported by a mother and was also documented by a physician. The infant developed vomiting and diarrhea, when the mother ate an apple and thereafter breast-fed him at 18 days of life, but the symptoms resolved shortly without any treatment. Skin eczema appeared on his face at 21 days of life and developed to trunk at 24 days of life. Therefore, the mother took the baby to our clinic at 25 days of life. On presentation, except eczema on his face and trunk, which was diagnosed as atopic dermatitis by a pediatrician and a dermatologist, his physical signs were not remarkable. His lungs were clear, and no heart murmurs were heard. Neither radiograph of his chest or neck, nor ultrasound scans of the heart or neck revealed any abnormality. Initial study for possible allergy revealed that the infant had positive wheal response to latex.

In addition, detailed examination of family history revealed that his father had dyspnea and swelling of the lips when he ate apple, banana, kiwi, or avocado on several occasions. The father also had urticaria on the hands when he wore latex gloves. In contrast, the mother had no remarkable history by eating various fruits or wearing latex gloves. Neither the father nor the mother had atopic dermatitis. These results prompted us to study latex allergy in detail. Total serum IgE concentrations of the infant, father and mother were 22, 1091, and 53 IU/mL, respectively.

INVESTIGATIONS

Subjects

After obtaining informed consent, the infant, his 32-year-old father, 29-year-old mother, and three normal adult controls were studied. Three normal adult controls were staff of the hospital; a 27-year-old male, a 29-year-old female and a 33-year-old male.

Skin prick test

Latex antigen (C-serum) was previously reported.^{6,7} Since the infant used a natural rubber nipple (COMBI Co. Ltd., Tokyo, Japan), a nipple composed of isoprene and natural rubber latex, or a nipple composed of silicone and natural rubber nipple, which was confirmed by manufacturer (PIGEON Co. Ltd., Tokyo, Japan), the extracts from three rubber nipples were made according to the method as previously reported.⁸ Briefly, these nipples were cut into 0.5 cm² pieces, and incubated in sterile physiological saline (1:5, w/v) at room temperature for 17 h. The extracts were then filtered through a Millipore filter (0.2 μ m) and used immediately. Allergens including egg white, egg yolk, cow's milk, soy, wheat, peanut, house dust mite, dog dander, cat dander and control solution were purchased from Torii Co. Ltd. (Tokyo, Japan). Skin prick test for apple, banana, kiwi, or avocado was performed as prick-by-prick test. As a positive control, histamine dihydrochloride (10 mg/mL; Sigma Chemical Co. St. Louis, MO) was used. Skin prick tests were performed on volar surface of the forearms, and after 15 min wheal responses were measured by staff who were blinded to the study as previously reported.⁷ Values of three normal controls were expressed as means.

Latex-specific IgE production

Serum latex-specific IgE was measured by commercial ELISA. In vitro production of latex-specific IgE was measured as previously reported.^{6,7} Briefly, peripheral blood was sampled, and mononuclear cells were separated. Mononuclear cells were cultured ($2 \times 10^5/0.2$ mL/well) with IL-4 (1000 U/mL; Ono Pharmaceutical, Co., Osaka, Japan), anti-CD40 mAb (100 ng/mL; Cosmo Bio, Tokyo, Japan) and latex antigen (0.1 ng/mL) in microtiter plates (Coster Corp., Cambridge, MA). After 14 days of culture, latex-specific IgE production was measured by ELISA, and values were expressed as means from triplicate cultures.

RESULTS*Study for latex allergy*

As shown in Table 1, results of the skin prick test revealed that the infant had positive wheal responses to latex, extracts from three rubber nipples (natural, silicon and isoprene), and apple. However, he was not allergic to banana, kiwi, avocado, egg white, egg yolk, cow's milk, soy, wheat, peanut, house dust mite, dog dander or cat dander as shown by negative wheal responses. On the other hand, the father had positive wheal responses to latex, extracts from three rubber nipples, apple, banana, kiwi, and avocado, but not to other allergens tested. In contrast, neither the mother nor the control had any positive wheal response to these allergens.

Serum latex-specific IgE levels were elevated in the infant (2.1 IU/mL) or the father (78.5 IU/mL), while they were not detected in the mother or normal controls (<0.34 IU/mL) (Table 1). We have pre-

TABLE 1. RESULTS OF LATEX ALLERGY TEST

<i>Study</i>	<i>Patient</i>	<i>Father</i>	<i>Mother</i>	<i>Controls</i> ^a
A.				
Skin prick test (Wheal: mm $\times$ mm)				
Latex	8 $\times$ 8	10 $\times$ 10	0 $\times$ 0	0 $\times$ 0
Extracts from natural rubber nipple	6 $\times$ 6	8 $\times$ 8	0 $\times$ 0	0 $\times$ 0
Extracts from isoprene rubber nipple	4 $\times$ 4	6 $\times$ 6	0 $\times$ 0	0 $\times$ 0
Extracts from silicone rubber nipple	4 $\times$ 4	6 $\times$ 6	0 $\times$ 0	0 $\times$ 0
Apple	6 $\times$ 6	9 $\times$ 9	0 $\times$ 0	0 $\times$ 0
Banana	0 $\times$ 0	6 $\times$ 6	0 $\times$ 0	0 $\times$ 0
Kiwi	0 $\times$ 0	7 $\times$ 7	0 $\times$ 0	0 $\times$ 0
Avocado	0 $\times$ 0	6 $\times$ 6	0 $\times$ 0	0 $\times$ 0
Egg white	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Egg yolk	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Cow's milk	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Soy	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Wheat	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Peanut	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
House dust mite	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Dog dander	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Cat dander	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
Histamine dihydrochloride	7 $\times$ 7	8 $\times$ 8	6 $\times$ 6	7 $\times$ 7
Control solution	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0	0 $\times$ 0
B.				
Production of latex-specific IgE				
Serum latex-specific IgE (IU/mL)	2.1	78.5	<0.34	<0.34
<i>In vitro</i> latex-specific IgE production (ng/mL)	1.5	4.6	<0.15	<0.15

^aMean values of three normal controls.

Patients, parents, and controls ($n = 3$) were studied for latex allergy. Values are the diameter of wheals by skin prick test (**A**), or serum latex-specific IgE levels and *in vitro* latex-specific IgE production by mononuclear cells (**B**).

viously reported that peripheral blood mononuclear cell from patients with latex allergy produced latex-specific IgE upon culture with IL-4, anti-CD40 mAb and latex antigen, while mononuclear cells from normal controls failed to do so.^{6,7} Table 1 shows that mononuclear cells from the infant or the father produced latex-specific IgE, while mononuclear cells from the mother or normal controls failed to do so.

Clinical course of the infant

The infant was treated with application of mixture of pinetal (Yoshida Pharmaceutical Co. Ltd. Tokyo, Japan) and zinc ointment for atopic dermatitis.⁹ The mother breast-fed the infant without eating apple, and partly fed him with conventional cow's milk-based formula by using a plastic spoon since 100% latex-free nipples were not available in Japan. Thereafter, he did not have any wheezing.

By 4 months of age, he is free from atopic dermatitis, and there have been no wheezing associated with feeding cow's milk-based formula by continual avoidance of latex nipples.

DISCUSSION

Recently, the prevalence of latex allergy in children are remarkably increasing. Case reports of skin symptoms (urticaria, eczema or angioedema), respiratory symptoms (wheezing or cough), or even anaphylaxis have been published.^{4,5,10,11,12} It should be noted that cases of infants, who are younger than a year, have also been reported. For example, an 11-month-old female infant had persistent cough since the age of 3 months, which was caused by a rubber pacifier.⁴ A 2-month-old female infant had episodic stridor since the age of 3 weeks, which was caused by latex nipple.⁵ Our 25-day-old patient is the youngest infant with latex allergy. Moreover, it has been reported that extracts from latex nipples or pacifiers caused allergic responses in patients with latex allergy,⁸ which is in accordance with our results.

This study also shows latex-fruit syndrome in the infant and the father. There have been cases that hidden latex caused anaphylaxis in children.^{11,12} Therefore, pediatricians should be aware of latex allergy even in young infants, especially when there is family history of latex allergy.

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Address reprint requests to:

Hajime Kimata, M.D., Ph.D.

Department of Allergy

Satou Hospital

65-1, Yabuhigashi-machi, Hirakata City

Osaka Prefecture, 573-1124, Japan

E-mail: kimata@misugikai.jp

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