Sensitization to Allergen Components from Natural Rubber Latex (*Hevea Brasiliensis*) in A 15-Year Old Girl Undergoing Multiple Surgical Procedures

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Abstract

This paper describes a case of anaphylaxis due to latex exposure during surgery. Allergic reactions to latex during surgery have been described in spinal bifida patients. The case presented in our manuscript is a 15-year old girl who experienced an anaphylactic reaction during her 12th surgery of giant hairy nevus on the thigh. She had a history of oral pruritus after ingestion of chestnut suggesting latex-fruit syndrome. Specific IgE was positive to latex and the allergen components Hev b 1, 3, 5 and 6.02. The diagnosis was latex-allergy due to sensitization obtained after multiple surgeries, possibly due to the contact of latex-containing gloves. Anaphylactic shock during surgery due to NRL allergy is being reported continuously. To prevent allergic reactions during surgery in patients who undergo multiple surgeries, not only in Spina Bifida (SB) patients, frequent analyses of specific IgE to NRL are essential as well as the documentation of the clinical history after ingestion of latex-fruit syndrome related foods. Measurement of specific IgE to allergen components from NRL might be useful in the diagnosis of NRL allergy and in the investigation of the route of NRL sensitization.

Introduction

The clinical history of latex-fruit syndrome related food reactions and frequent measurement of specific IgE to natural rubber latex are important to prevent allergic reactions during multiple surgeries. The specific IgE reactivity to latex components could explain the route of sensitization.

Sensitization to natural rubber latex (NRL) is an important cause of anaphylaxis in children requiring multiple surgeries. Those patients are repeatedly contacted with NRL from gloves and medical devices [1]. Skin prick test (SPT) and specific IgE antibody measurement to NRL are useful for diagnosing sensitization. However, these tests are not clinically specific due to presence of cross-reactive components in the NRL extract. Recently, specific IgE assays with allergen components from NRL are commercially available as research reagents. It is reported that measurements of specific IgE to some components from NRL were more specific than specific IgE to crude extract [2]. The sensitization pattern to these components differs among patients with NRL allergy [3].

Case Report

A 15-year old girl was referred to our allergy outpatient clinic for investigating a course of anaphylactic shock during her 12th surgery of giant hairy nevus on the thigh. She never had any allergic responses in the previous surgeries. General anesthesia was induced with remifentanyl, ketamine and propofol. Lidocaine, Fosfomycin and amino-acid formula were also administrated. Two hours later, her blood pressure and arterial blood oxygen saturation decreased and then she developed a systemic wheal reaction. Immediately, adrenaline and methylprednisolone were administrated. About 2 minutes later, her blood pressure increased.

Initially, the cause of anaphylaxis was considered to be either lidocaine, amino-acid formula or Fosfomycin. SPT was performed with these 3 drugs. However, the SPTs were all negative. The patient had a history of oral pruritus after ingestion of chestnut. Reactions to other latex-fruit syndrome related foods were unclear. As chestnut has cross-reactive allergen components with NRL, we suspected NRL as the cause of the anaphylaxis. Specific IgE antibodies to NRL and latex components (Hev b 1, Hev b 3, Hev b 5, Hev b 6.02, Hev b 8, Hev b 9 and Hev b 11) were measured by ImmunoCAP (Thermo Fisher Sci-

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entific, Uppsala, Sweden). Specific IgE antibody titers to crude NRL, Hev b 1, Hev b 3, Hev b 5 and Hev b 6.02 were 76.1, 2.24, 34.3, 74.6 and 1.56 UA/ml, respectively. Specific IgE to the other NRL components were negative (**Table 1**). From these results, the cause of anaphylactic shock was diagnosed as allergy to NRL due to sensitization after multiple surgeries.

Allergen	Specific IgE titer (kU _A /L)
Crude NRL	76.1 positive
Hev b 1	2.24 positive
Hev b 3	34.3 positive
Hev b 5	74.6 positive
Hev b 6.02	1.56 positive
Hev b 8	<0.1 negative
Hev b 9	<0.1 negative
Hev b 11	0.18 negative
Negative: < 0.35 kUA/L	
NRL: natural rubber latex	

Table 1: Results of specific IgE to NRL and latex components

After this fatal surgery, the patient has had 5 similar surgeries under a NRL-free environment and she never developed any further allergic reactions. As she has had systemic urticarial reactions after ingestion of yogurt containing mango and blueberries, she is eliminating foods related to latex-fruit syndrome from her diet.

Discussion

NRL allergy has been recognized as a serious health problem. High risk factors of NRL allergy are congenital abnormality in the urinary system, neural tube anomaly such as spinal bifida (SB), multiple surgeries [4], occupational exposure, allergy to foods related to latex-fruit allergy, and history of allergic diseases. Management of patients with NRL allergy includes avoidance of NRL exposure. However, completely clearing of NRL from hospital environment is difficult due to its usability and cost issues.

The most common cause of anaphylaxis during anesthesia is reported to be muscle relaxant agents followed by NRL and antibiotics [5]. We initially performed SPTs to drugs for anesthesia, but all tests were negative. Many cases of NRL allergy in patients undergoing multiple surgeries have been reported. The concentration of specific IgE antibodies to NRL has been correlated with the number of surgeries in patients with SB. Having more than five surgeries significantly increases the risk of sensitization to NRL [4]. The patient described in this report has had oral pruritus after ingestion of chestnut. So, we suspected NRL as the cause of the anaphylactic shock despite her never having any allergic reactions during her previous 11 surgeries. Specific IgE to NRL and allergen components from NRL was measured. The patient

was strongly sensitized to NRL (76.1 UA/ml), Hev b 3 (34.3 UA/ml) and Hev b 5 (74.6 UA/ml). Hev b 3 has been found to be an important allergen component in NRL-allergic patients with SB but not in health care workers (HCW) [6]. Hev b 5-specific monoclonal antibodies and human IgE from HCW with NRL allergy demonstrated a greater content of Hev b 5 in powdered glove extract [7]. Ylitato reported different IgE antibody patterns between NRL-allergic children who have not undergone surgery and those with multiple surgeries [3]. In the former cases, the major sensitizing components were Hev b 6.01 and Hev b 6.02, but not Hev b 1. These findings were similar to the IgE sensitization pattern of allergic HCW. In patients with multiple surgeries, sensitization was predominately to Hev b 1 and Hev b 3. Our conclusion from these results is that the patient described in this report might have been sensitized to NRL by multiple contacts with NRL gloves of the surgical staff.

Anaphylactic shock during surgery due to NRL allergy are continuously reported [8,9]. To prevent allergic reactions during surgery in patients who undergo multiple surgeries, not only in SB patients, frequent analyses of specific IgE to NRL are essential as well as the documentation of the clinical history after ingestion of latex-fruit syndrome related foods. Measurement of specific IgE to allergen components from NRL might be useful in the diagnosis of NRL allergy and in the investigation of the route of NRL sensitization.

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