

Natural Rubber Latex Allergy Is Not a Cause of Sudden Infant Death

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Key Words

Natural rubber latex · Anaphylaxis · Sudden infant death

Abstract

Background: The causes for sudden infant death (SID) remain unclear. As infants can become sensitized to NRL allergens by pacifiers and latex mattresses, we tried to establish whether there is a relationship between SID and natural rubber latex (NRL) allergy. **Methods:** We determined NRL-specific IgE concentrations in 112 unselected cases of SID by the CAP-FEIA method. **Results:** NRL-specific IgE could be detected only in 1 sample (0.64 kU/l; CAP class 1). **Conclusions:** We conclude that NRL allergy is not a cause of SID.

Introduction

Sudden infant death (SID) occurs in up to 5 out of 1,000 newborns in industrialized countries [1]. The reasons for SID remain unclear. The infants die unexpectedly, mostly during sleep, and there is no apparent underlying disease causing the death. Formerly, anaphylaxis from cow's milk allergy [2] was suspected as a contributing factor, but measurement of specific IgE to common allergens did not confirm this hypothesis [3–6].

Since the first publication of an allergic systemic [7] and contact [8] urticaria, it is known that natural rubber latex (NRL) can lead to allergic reactions, and severe anaphylaxis with lethal complications has been described [9, 10]. Children with spina bifida and/or urogenital anomalies are at high risk of developing NRL allergy since they are often exposed to NRL allergens during diagnostic and therapeutic procedures including operations [11, 12]. But exposure to NRL also occurs in everyday life, for example by contact with pacifiers or latex mattresses. Therefore, we wondered whether children who died from SID might have had an NRL sensitization as a potential cause of death. We also investigated whether the infants were sensitized to common food or inhalant allergens.

Material and Methods

112 unselected children (age 1–17 months) who died of SID between 1984 and 1996 were included in the study. Full blood samples from the heart of the infants were stored at –20°C until analysis. The blood samples were completely hemolyzed. Specific IgE antibodies to NRL (k82), banana (f92) which cross-react with latex allergens [13], 'food-mix' (fx5, containing hen egg, cow's milk, cod fish, wheat flour, soy bean, peanut) and 'aeroallergen mix' (sx1, containing grass, birch, rye and artemisia pollen, cat, dog, cladosporium and *Der-matophagoides pteronyssinus*) were measured by the CAP-FEIA method (Pharmacia, Freiburg, Germany).

In order to investigate a potential influence of hemolysis on the analysis of specific IgE levels, we measured IgE concentrations in sera of 5 patients with k82 and sx1 >0.8 kU/l (RAST class 2) and

compared the results to the IgE determination in completely hemolyzed samples. Hemolysis was achieved by 2 freeze-thaw cycles. We found equivalent data regardless of which sample (serum or hemolytic sample) was used (data not shown).

The exact time of death was not determined in our study. The samples were immediately taken at the time when the dead child was seen by the physician. Therefore, we do not know the exact latency between the infant's death and the time when the full blood samples were obtained from the heart.

Information on the past medical history was available for 95 out of 112 cases.

Results

Only one of the 112 infants showed an elevated concentration of NRL-specific IgE antibodies (0.64 kU/l, CAP class 1). The clinical relevance of this finding is not clear. The infant's parents did not describe any symptom of NRL allergy; we therefore assume that the NRL sensitization did not cause the child's death. The infant was considered as atopic if sx1 was elevated (2.92 kU/l) and if total IgE concentration was above 100 kU/l.

Two more children exhibited increased sx1 values (0.37 and 0.40 kU/l, respectively) and in 4 cases, we found specific IgE antibodies against the food allergen mix fx5 (5.43, 2.73, 6.85, 2.93 kU/l). The results are summarized in table 1.

With respect to the history of the infants, the family history was positive for hypersensitivity reactions only in 4 out of 95 cases: in 1 case, the mother reported to suffer from asthma. In 2 more cases, the family history for asthma was positive, but not in first-degree relatives. One parent seemed to have a delayed-type hypersensitivity reaction to rubber. The infant itself was reported to suffer from an allergic reaction only in 1 case. According to the records, this was a plaster allergy, and it is not known whether this was classified as an immediate-type or late-type reaction. In this case, no specific IgE antibodies to NRL or other aeroallergens or food allergens could be detected.

Discussion

The rising incidence of NRL allergy is a medical problem. Symptoms of NRL allergy include contact urticaria, rhinitis, conjunctivitis, asthma and severe, even lethal anaphylactic reactions [14]. Risk factors for NRL sensitization are atopy [15], hand eczema, female gender and occupational exposure, e.g. medical staff [16] or workers in the glove-producing industry. About 50% of the pediatric patients with spina bifida and/or urogenital anomalies exhibit

Table 1. Positive RASTs in SID (n = 112)

Allergen	Number of cases with CAP > 0.35 kU/l
Latex (k82)	1
Inhalant allergens (sx1)	3
Food allergens (fx5)	4
Banana (f92)	0

Table 2. Distribution of total IgE in all SID cases (n = 112) and in the nonatopic SID cases (n = 106)

	Total IgE concentration (kU/l)	
	all SID cases (n = 112)	nonatopic SID cases (n = 106)
Minimum	0	0
25% percentile	0	0
Median	2	0
75% percentile	5.1	3.96
Maximum	152	78.6
Mean	7.491	4.229
Standard deviation	20.60	10.06
Standard error	1.946	0.977

NRL sensitization [11, 12]. We therefore wanted to investigate whether NRL allergy could be a cause of SID. Even though it is already known that general allergen hypersensitivity is not a common etiology of SID [3, 6], we wanted to know whether there is a relationship between NRL allergy and SID. Infants are exposed to NRL through direct contact with pacifiers, nipples of feeding bottles and nipple shields or by sleeping on a latex mattress. NRL may also be viewed as an aeroallergen [17].

We could detect NRL-specific IgE only in 1 out of 112 cases, and the concentration was quite low (0.64 kU/l). Retrospectively, this result could not be regarded as the cause of the infant's death. In 6 cases, we found specific IgE antibodies against the food allergen mix fx5 and/or aeroallergens sx1. The sensitization could be made responsible for the death of the infants in none of these cases. From our results, we conclude that allergen hypersensitivity is not a cause of SID. This conclusion is based on RAST results. The possibility of a negative RAST test in spite of an existing NRL allergy is not totally excluded.

In addition, it could be argued that autolysis of IgE antibodies might have contributed to the negative findings of

our study. In order to rule out a general destruction of immunoglobulins during storage, we measured total IgE levels in the samples and compared the results with the total IgE concentration in the sera of infants of the same age. These data have been published in the literature [18]. The distribution of total IgE concentrations in the nonatopic (defined as negative sx1 and fx5) SID cases (table 2) is similar to these

data [18]. We conclude that the IgE molecules were not destroyed by handling.

Our data confirm the results of a smaller study which investigated the relationship between sensitization to aeroallergens and food allergens and 51 cases of SID [19]. Taken altogether, we conclude that there is no specific NRL allergen hypersensitivity in SID.

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