Latex allergy in children: a follow-up study

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ABSTRACT

Background: Natural rubber latex allergy is an important health problem. Multiple contacts with latex in childhood are a risk factor. Many aspects of this disease are still unknown, one of which is the clinical outcome of these children. The aim of this study was to evaluate the clinical and epidemiological features of latex allergy and compliance with latex avoidance instructions in allergic children.

Material and methods: Seventeen consecutive patients with a history of latex allergy, fruit allergy or chronic urticaria were selected. The patients underwent a skin prick test and determination of specific-IgE to latex at the start and at end of the study (median follow-up: 3 years). At diagnosis, patients with a positive result to one of the tests and a clinical history of latex allergy were considered allergic; patients with a positive test but without a clinical history suggestive of allergy were considered sensitized. These children were given latex avoidance instructions.

Results: Eleven children (64.7 %) were classified as allergic and 6 (35.3 %) as sensitized. Five patients had undergone latex-free surgery after diagnosis without incident. During follow-up, 11 patients (8 allergic and 3 sensitized) had contact with latex. Contact occurred in the home in 10 children, and all were symptomatic. Specific-IgE levels to latex at the end of the study were significantly higher in patients who had contact with latex during the follow-up period than in those without latex contact.

Conclusions: Strict compliance with latex avoidance instructions is essential both inside and outside the hospital. Greater emphasis should be placed on reducing latex exposure in the home and school environments, as such contact could maintain positive IgE-antibody levels.

Key words: Rubber latex. Allergy. Childhood. Skin prick tes. Specific-IgE.

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INTRODUCTION

Nutte described the first case of contact urticaria with latex in 1979[1] in a housekeeper who used natural rubber latex globes working at home. Since then specific-IgE mediated allergy to latex has been considered an important growing health problem because of the increase of his frequency, the severity of the reactions and the fact of being considered as an occupational disease[2-4], that includes risk groups of patients as natural rubber industry workers and health care workers as the most importants[5-7], but hairdressers[8], cookers and other professionals who use latex products at work also.

Another very important risk group is children with great and exposure to latex products in early childhood, especially those with spina bifida[9,10] and other urogenital disorders that had undergone multiple operations. Mechanical ventilation[11] and atopy[12] had been described as risk factors for latex allergy too.

The prevalence of natural rubber latex (NRL) allergy in children is very different depending on the di-

Table I

Prevalence of latex allergy in children

Authors	n	Prevalence (%)	Diagnosis tests
Estornell F.[10]	100**	29	SPT and Specific-IgE
Novembre E.[13]	2500	0,4	SPT
Bernardini R.[14]	1175	0,7	SPT
Ylitalo L.[15]	3269	1,1	SPT
		1	RAST y Use test
Eseverri JL.[16]	282	1,08	SPT
		7,2	Specific-IgE
Libke C.[17]	306*	20,8	Specific-IgE
Mazón A.[18]	68**	26	SPT and Specific-IgE
Kelly KJ.[19]	84	50,6	SPT

*Atopics.
**Spina bifida.
SPT: skin Prick test.

agnostic tests that were used for the authors and the patients included in the study[13-19] (table I).

Several studies were realized in spina bifida patients finding prevalence from 26 % to 50 %[18,19].

A lot of aspects of this disease are still unknown; one of them is the clinical evolution of those children.

OBJECTIVE

The objective was the clinical and epidemiological evaluation of NRL allergy and latex avoidance instructions in our allergic children.

METHODS AND PATIENTS

Selection of patients

17 consecutive patients were selected from the children who came to our hospital from December 1999 to June 2000, with a clinical history of latex allergy, fruit allergy or chronic urticaria. We realized them:

– A prick test with latex commercial extract (concentration 1/10 w/v).
– Determination of specific- IgE antibodies to latex by CAP Pharmacia system.

Classification of patients

The patients were classified in two groups following the next criteria:

– Those children with one positive test (SPT or specific IgE) and a positive clinical history of latex allergy were considered allergic.
– Those with one positive test and without a suggestive clinical history of allergy to latex in fact they tolerate currently contact with latex products, were classified as sensitised.

After the diagnosis we gave them oral and written latex avoidance instructions. They were followed up for a period from 1 to 7 years (median of 3 years).

At the end of this period:

– We asked them about contacts with latex, at medical and home environment.
– We realized them a skin prick test (SPT) with latex commercial extract (concentration 1/10 weight/volume). Histamine dihydrochloride (10 mg/ml) served as positive control and physiological saline as negative control. A wheal of 3 mm or larger was regarded as positive, according to EAACI guidelines[20].
– We realised latex specific-IgE antibodies determination by the CAP Pharmacia system. Specific IgE values greater than 0.35 Ku/L were regarded as positive.

STATISTICS

Median, minimum and maximum values were used to describe continuous variables, and total and relative frequencies to describe categorical variables. Chi-square test or Fisher's exact test was used to compare the population of allergic and sensitised. Wilcoxon matched-pair test was used to compare the results of SPT and latex specific-IgE at the diagnosis and at the end of the follow up. The patients who had undergone multiple operations and those who did not have, allergic and sensitised children were analysed separately. The Mann-Whitney U test was used to compare the SPT and specific-IgE levels at the end of the study in children who had contact with latex after the diagnosis and those who did not have. P-values below 0.05 were considered significant.

RESULTS

We studied the clinical and epidemiological characteristics of our patients. Twelve of our children were males (70.6 %) and 5 were females (29.4 %). The median age was 10 years (range 4 to 17).

Nine of the patients (52.9 %) had undergone surgery before the diagnosis of sensitisation to latex;

the median of the number of operations was two. One of these 9 children was a patient with spina bifida.

Fifteen children (88.2 %) were atopic (respiratory allergy, food allergy or atopic dermatitis). Thirteen patients (76.5 %) had rhinitis and asthma due to pollen hypersensitivity, and 5 (29.4 %) had respiratory allergy to animals epithelium.

Atopic dermatitis was present in 6 of the 17 children (35.3 %) and 11 (64.7 %) had fruit allergy (kiwi, banana, avocado) or nuts (chestnut, hazelnut).

Eleven patients (64.7 %) were diagnosed as allergic to latex, and 6 (35.3 %) as sensitised, with the criteria described before (fig. 1). All the patients who referred a clinical history of immediate reactions after contact with latex had a positive SPT to latex extract.

We did not find significant differences in sex, atopic dermatitis, allergic rhinitis or asthma and food allergy between allergic and sensitised patients. The number of patients with history of multiple operations before the diagnosis was significantly higher in allergic than in sensitised children (p = 0.043, OR 13.3 (95 % confidence interval 1.07-166.4) (table II).

The age of the allergic children was higher than the sensitised group, but this difference did not was statistical significant.

No differences were found between the results of the SPT and latex specific-IgE obtained at the beginning and at the end of the study. We analysed separately three groups: patients who had a history of multiple operations, allergic and sensitised and no differences were found in each group (tables III and IV).

During the follow up 5 patients had undergone free-latex surgery after the diagnosis without any allergic complications (4 were allergic and 1 sensitised).

The frequency of latex contacts was higher in allergic (72.7 %) than in sensitised (50 %) (fig. 2). Only 3 out of the allergic patients completely avoided latex products. In two of them the SPT and specific-IgE levels decreased, but only one had a negative SPT to latex at the end of the study. The third patient did not have relevant changes in his diagnostic tests.

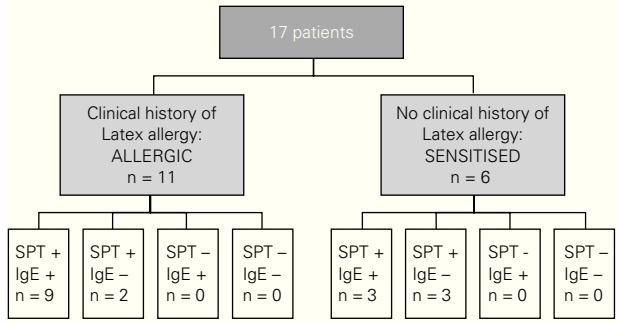

Figure 1.—Clasification of the patients and diagnostic tests results. SPT: skin prick test to latex; IgE: specific-IgE antibodies to latex by CAP Pharmacia system.

Table II

Comparation between allergic and sensitised children

	Allergic (n = 11)	Sensitised (n = 6)
Males	7 (63.6 %)	5 (83.3 %)
Median age	8 (4-14)	11 (7-17)
Previous surgery*	8 (72.7 %)	1 (16.7 %)
Atopic	10 (90.0 %)	5 (83.3 %)
Rhinitis/asthma	8 (72.7 %)	5 (83.3 %)
Atopic dermatitis	4 (36.4 %)	2 (33.3 %)

*p = 0,043, Fisher's exact test.

Table III

SPT and specific-IgE at the begining and at the end of the study in allergic and sensitised children. No significant statistical differences were found (Wilcoxon test)

	Median (beginning) (minimum-maximum)	Positives (n)	MEDIAN (end) (minimum-maximum)	Positives (n)
Total				
SPT (mm)	5 (2-7)	15	4 (0-10)	12
CAP (Ku/l)	2,96 (< 0,35-42,8)	12	1,81 (< 0,35-42,5)	14
Allergic				
SPT (mm)	4,72 (3-7)	11	3,81 (2-6)	9
CAP (Ku/l)	6,96 (< 0,35-42,8)	9	6,65 (< 0,35-42,5)	10
Sensitised				
SPT (mm)	4,5 (2-6)	4	2,5 (0-10)	3
CAP (Ku/l)	0,35 (< 0,35-6,56)	3	3,02 (< 0,35-33)	4

Table IV

SPT and specific-IgE at the begining and at the end of the study in children who had undergone surgeries and those who had not. No significant statistical differences were found (Wilcoxon test)

	MEDIAN (begining) (minimum-maximum)	Positives (n)	MEDIAN (end) (minimum-maximum)	Positives (n)
Previous surgery				
SPT (mm)	4 (3-6)	9	4 (2-6)	6
CAP (Ku/l)	3,42 (< 0,35-42,8)	7	1,29 (< 0,35-42,5)	8
No previous surgery				
SPT (mm)	5 (2-7)	7	4 (0-10)	6
CAP (Ku/l)	2,72 (< 0,35-7,32)	5	4,75 (< 0,35-33)	6

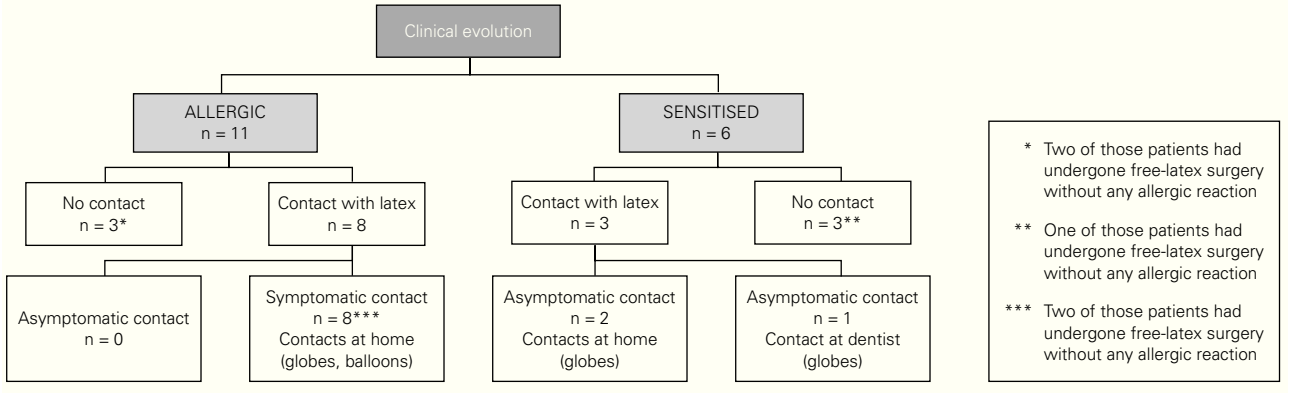

Figure 2.—Clinical evolution of the patients during the follow-up.

The other allergic patients, 8 (73 %), had contact with latex; all of them were contacts at home (gloves, balloons) and all of them were symptomatic. The symptoms were urticaria and angioaedema.One of these 8 patients had a negative SPT to latex at the end of the study, but a positive determination of specific-IgE antibodies. Half of the sensitised patients did not complied with the latex avoidance instructions: one of them came to the dentist and did not notified and he did not have any allergic reaction with the contact with latex gloves. The level of specific IgE antibodies to latex of this patient was greater at the end of the study. The other two patients had latex contact at home, having urticaria and angioaedema. This two sensitised children became allergic during the follow up; the values of SPT and specific-IgE increased in this two patients. The other 3 sensitised children complied the latex avoidance; none of them had significant changes in their diagnostic tests.

Specific-IgE to latex was significantly higher at the end of the study in those patients who had contact with latex (specific-IgE median 0.54 Ku/l) compared to those who completely avoid latex (specific-IgE median 4.86 Ku/l) (p = 0.007, Mann-Whitney U test). No differences were found in SPT values.

DISCUSSION

Children with spina bifida and other urogenital disorders requiring multiple operations, are one of the most important risk group to natural rubber latex allergy[9,10].

In our study surgery in early childhood increased the risk for having clinical latex allergy instead of being sensitised (one positive test and no symptoms with latex). We did not find differences between allergic and sensitised in age, sex, respiratory allergy, atopic dermatitis, food allergy. Atopic dermatitis has been described several times as a risk factor to latex allergy; but we did not find evidence of this maybe because of the small sample.

Several recommendations for preventive measures had been published in the last years[21-23]. Some studies had evaluated their effectiveness.

In two studies realised in a healthcare workers population with latex hypersensitivity, a decrease of

IgE to latex levels after changing latex gloves in the hospital environment was found[24,25].

There are other studies that evaluate not only primary but secondary prevention too in multioperated children. Cremer et al[26], did not find a decrease of specific IgE in children with spina bifida despite of avoidance instructions.

The authors Ylitalo y Turjanmaa[27], in 2000, included in their study patients with spina bifida and patients without previous surgeries. They described the difficulty for children to completely avoid latex and concluded that secondary prevention did not decreased e the levels of the diagnostic tests. An explanation could be the latex contacts at home. They recommend paying more attention to home environment.

Nieto et al[28], two years later, concluded that primary prevention measures in children with spina bifida decreases the prevalence of latex allergy.

The same year another study including patients with spina bifida and other neurologic defects concluded that secondary prevention is effective and that more stress must be put on the avoidance of latex in the medical setting than out[29].

In our study the hospital was a safety free-latex environment, in fact 5 children had undergone surgery without any allergic problem. The specific-IgE levels of those patients did not change significantly. Despite the avoidance instructions, 11 of the patients (64 %) had contact with latex at home, and in all specific-IgE levels increased, so this latex exposure in home environment could be responsible of maintaining the latex hypersensitivity in those children, as it was mentioned in previous studies[27].

About the other patients, SPT and IgE antibodies did not change significantly during the study, neither between allergic and sensitised patients. Ylitalo et al, in their study of the year 2000, did not find differences in those tests between symptomatic and asymptomatic patients too. More studies are needed to clarify the role of the prick test and the specific IgE in the follow up of children with latex IgE allergy.

After the diagnosis the main avoidance instructions point out the importance of avoid latex exposure in medical setting, because an important allergic group is multioperated patients and several times they need continuous medical assistance. In our paper only one patient belong to this group, so in our patients home environment became the most important exposure place to prevent.

In conclusion, the efficacy of primary prevention has been demonstrated in previous studies, and must be used as the first step in risk population. About secondary prevention, we must care about medical environment because latex is a very important allergen at the hospital. According to our study we must put more stress on home and school setting, in order to reduce those NRL contacts, that could maintain latex hypersensitivity in some patients.

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