

Efficacy of latex avoidance for primary prevention of latex sensitization in children with spina bifida

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Over 6 years, the prevalence of latex sensitization fell from 4/15 (26.7%) to 1/22 (4.5%) in children with spina bifida treated in a latex-free environment from birth compared with historic controls. These precautions appear to be efficacious for the primary prevention of latex sensitization. (J Pediatr 2002;140:370-2)

As many as 72% of children with spina bifida (SB) are allergic to latex or natural rubber.¹ The American Academy of Allergy, Asthma, and Immunology has therefore recommended a latex-free environment for all procedures performed on patients with SB² to prevent the development of latex allergy.

To study the efficacy of latex avoidance measures for primary prevention, we compared the prevalence of latex sensitization in 2 groups of children with SB, one group born before and the other after these measures were implemented in our hospital.

METHODS

Patient Selection

Among our 132 patients with SB (aged 19 months-23 years), we selected 2 groups of children, solely on the basis of their dates of birth, regardless of whether they had any reactions to latex.

Group I had 15 children first evaluated for latex sensitization before September 1, 1994 who were born in the previous 6 years. They had no preventive measures before evaluation and, thus, they were representative of the natural history of latex allergy.

Group II included 22 children born after that date, when a latex-free environment was implemented in our hospital, together with parental instruction concerning the avoidance of latex. Group II was studied before September 1, 2000, throughout a period of 6 years. When more than one evaluation was available for a patient, the latest was used.

Methods

Data were recorded regarding sex, age, family, personal history of atopy, number of operations (with or without latex), number of cystourethrograms, presence of a ventriculoperitoneal

shunt, history of intermittent bladder catheterization, and clinical reactions to latex.

Skin prick tests with commercial latex, banana, and chestnut antigens (ALK-Abelló Labs, Spain) were performed in all patients. A prick lancet (DHS 0473) was used. Skin tests were graded 0 to 4+ compared with 1% glycerinated histamine.³ No wheals were found with saline solution control tests. Skin tests caused no adverse reactions.

Serum total immunoglobulin E (IgE) was quantified in U/mL and also converted to z units. Serum specific IgE to latex, banana, and chestnut (Pharmacia, Uppsala, Sweden) was measured in all cases.

IgE	Immunoglobulin E
RAST	Radioallergosorbent test
SB	Spina bifida

After diagnostic criteria previously published,⁴ patients with skin tests $\geq 2+$ ($>25\%$ of area of histamine wheal) and/or radioallergosorbent test (RAST) class ≥ 2 (≥ 0.7 U/mL) were considered sensitized to latex.

Statistical Study

χ^2 tests were used to compare categorical variables. Numeric variables were compared with Student *t* test, or with nonparametric Mann-Whitney *U* test when indicated.

RESULTS

We studied a total of 37 children with SB (Table I); none of the patients had clinical reactions to latex. The results of sensitized patients are shown in Table

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Supported in part by a grant of the Spanish Society of Allergology and Clinical Immunology Foundation.

Submitted for publication Mar 16, 2001; revisions received July 19, 2001, and Nov 7, 2001; accepted Dec 21, 2001.

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0022-3476/2002/\$35.00 + 0 9/22/122732

doi:10.1067/mpd.2002.122732

Table I. Description and sensitization status of patients born 6 years before and after a latex-free environment was implemented

	Group I before	Group II after	P
N	15	22	
Sex (m/f)	8/7	11/11	.84
Age (y) (range)	3.3 ± 1.7 (0.8-5.6)	2.1 ± 1.4 (0.1-4.9)	.03
No. of operations (range)	3.3 ± 1.5 (2-7)	2.8 ± 2.3 (1-12)	.08
No. of cystourethrograms (range)	2.3 ± 1.1 (1-4)	1.5 ± 1 (0-4)	.01
Ventriculoperitoneal shunt	13/15	19/22	.98
Personal history of atopy	0/15	3/22	.14
Family history of atopy	3/15	9/22	.18
Intermittent bladder catheterization	8/15	12/22	.94
Serum Total IgE in U/mL (range)	59.8 ± 67.1 (2-202)	53.8 ± 73.4 (2-272)	.61
Serum total IgE in z units (range)	1.6 ± 1.7 (-1.44-4.35)	2 ± 1.6 (-0.5-5.22)	.45
Sensitized to latex	4 (26.7%)	1 (4.5%)	.053

Procedures in group II were performed without latex.

Table II. Description of sensitized patients, born before (pre) and after (post) implementing a latex-free environment

Period	Age (y)	Serum total IgE U/mL	Serum total IgE z-units	Latex skin prick tests	Latex RAST test U/mL	No. of operations
Pre	2.5	39.7	2.5	4+	1.23	3
Pre	1.5	202	4.4	0	3.22	2
Pre	4.9	96.3	2.1	3+	0.44	3
Pre	5.4	182	2.5	0	2.02	4
Post	4.6	5.36	-0.5	2+	< 0.35	3

All patients had a ventriculoperitoneal shunt, and none had family or personal history of atopy.

II. The patient in group II had a negative RAST test and only a weakly positive skin test, whereas the patients in group I had stronger and clearer responses, either by skin test or RAST.

No patient had clinical reactions suspicious of food allergy. Skin tests and RAST tests to banana and chestnut were negative in all instances.

DISCUSSION

Because of the high frequency of allergy to latex, especially in developed countries, the practice of diagnostic

and therapeutic procedures with latex in children with SB carries a serious hazard.⁵ Although there is a distinction between latex allergy with clinical reactions and latex sensitization, in which the presence of latex specific IgE antibodies has caused no clinical symptoms, the avoidance of latex is currently recommended for all children with SB, regardless of their sensitization status.^{2,6}

The atopic diathesis and the number of operations with latex gloves are the main risk factors for the development of both latex sensitization and allergy.^{3,5,7} The direct contact of latex gloves with

blood vessels and open mucosa is capable of inducing sensitization even in nonpredisposed subjects. The relative role of other routes of exposure (rectal, urethral, respiratory, and cutaneous) remains to be clarified.

Adult patients with multiple surgeries for spinal cord injury show a much lower prevalence of latex hypersensitivity.¹ Hence, the age of exposure to latex is also important. The allergic prone Th₂ lymphocyte responses, predominant in the fetus, commonly switch to defense Th₁ responses after birth because of microbial stimulus. Nevertheless, early exposure to an allergen-like

latex might consolidate the neonatal Th₂-response, precluding the normal Th₂-Th₁ switch and inducing future allergic responses.⁸

Recommendations by the American Academy of Allergy, Asthma, and Immunology are limited to the medical setting,² but the widest avoidance of latex from birth and at home is felt to be the cornerstone for the primary prevention of latex sensitization, that is, to prevent the development of specific IgE antibodies in nonsensitized children.

With the use of a latex-free environment, no sensitization was found among 12 patients younger than 2 years old compared with 3 of 7 children studied when latex was still being used.⁹ There is another report of a declining prevalence from 28.9% to 6.7%.¹⁰ Our data, after 6 years of latex avoidance, show a 6-fold decrease in the prevalence of latex sensitization. Furthermore, the only sensitized girl in group II had weakly positive skin tests and a negative RAST test, whereas the sensitized children in group I had stronger positive responses in skin or RAST tests.

In addition to SB, other children requiring multiple surgeries are also at risk of sensitization to latex¹¹; therefore, it is most appropriate to extend preventive measures to all children in whom a

high number of operations is to be expected, especially when these commence at an early age.

Surgery is not the only route for sensitization, because as many as 16% of atopic children who have not had operations have latex-specific IgE antibodies.¹² Consequently, latex avoidance must be practiced not only at hospitals, but also by primary care providers, dentists, and everyone involved in the care of children.

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