

Prevalence of latex allergy in spina bifida: genetic and environmental risk factors

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Abstract. – *Aim of Study:* To evaluate the prevalence of latex allergy in a population of children with spina bifida (SB) and to assess the role of early exposure to latex products and others risk factors.

Introduction: SB is related with an higher incidence of latex allergic reactions. These patients received repeated surgical procedures, implant of latex-containing materials and catheterization.

Materials and Methods: Eighty consecutive subjects affected with SB besides answering a questionnaire, underwent a skin-prick test (SPT) to latex and the determination of the specific serum IgE (RAST CAP) to latex. 40% (32/80) of the patients showed a latex sensitization with specific IgE > 0.7 kU/l but only twelve of the 32 sensitized patients (40%) suffered from clinical reactions to latex (urticaria, conjunctivitis, angioedema, rhinitis, bronchial asthma). Number of surgical procedures, but particularly early exposure to latex and familiarity for allergy are correlated with latex allergy ($p < 0.01$).

Conclusion: Latex allergy in SB children is multifactorial situation related with a disease-associated propensity for latex sensitization, early exposure and number of surgical procedures. Prophylactic measures to avoid the exposure, not only in the sanitary environment, through the institution of latex-safe routes and every day, prevent potentially serious allergic reactions.

Key Words:

Latex allergy, Spina bifida, Early exposure, Surgical procedures.

Introduction

The high prevalence of latex sensitization in patients with spina bifida (SB) has been correlated to genetic tendency to develop latex IgE re-

sponses^{1,2}. Multifactorial pathogenesis with correlation between genetic and environmental factors is suitable. Exposure to latex products through repeated surgical procedures and catheterization have been related with latex allergy (hypersensitivity to latex and clinical manifestations) in SB population. In these patients serious systemic reactions included anaphylactic reaction usually occur after mucosal exposure to latex devices or during surgical procedures, but may also occur under a variety of other circumstances of the day-life³⁻¹⁰. The aim of the present study was to evaluate the role of possible risk factors, particularly early exposure to latex products, atopy and number of surgical procedures, in the pathogenesis of latex allergy in a population of children with SB.

Materials and Methods

80 children (32 male and 48 female) aged between 1 and 24 years (mean \pm SD 8,7 \pm 6,9 years) with SB referred to the Spina Bifida Centre of the Catholic University, Pol A. Gemelli of Rome had been enrolled. All patients' parents gave written informed consent to the study. All children were regularly followed for neurological, psychiatric and urological problems; of these 60 with myelomeningocele, 12 with meningocele and 8 with lipomeningocele; 54 had the ventricular-peritoneal shunt for hydrocephalus (Table I).

Personal data of each patients, particularly regarding number of surgical procedures, early exposure to latex, catheterization, atopy, presence of allergic symptoms (rhinitis, asthma, dermatitis) or in their close blood-relations (parents, brothers, grandparents), the presence of adverse reactions to foods and after latex devices (gloves, balloons, dummies), were recorded.

Table I. Characteristics of sample.

	Total	Allergic	Sensitized	Non sensitized
Patients	80	12	20	48
Gender (M)	32	4	8	20
Age (mean years)	8.7	12,8	12,1	5,2
DVP°	54	10	19	25
MMC*	60	9	18	33
MC#	12	2	1	9
LMC§	8	1	1	6

°DVP: ventricular peritoneal shunt, *MMC: myelomeningocele, # MC: meningocele, §LMC: lipomeningocele

Total IgE (PRIST) and specific IgE to latex (RAST) were gained by 5cc venous blood sample.

Specific IgE to latex were measured using an immunoenzymatic method (UniCAP System; Pharmacia, Uppsala, Sweden) and the references values were provided by the manufacturer. Results were classified as class 0 for values lower than 0.35 kU/L, class 1 for values between 0.35 and 0.7 kU/L, class 2 for values between 0.7 and 3.5 kU/L, class 3 for values between 3.5 and 17.5 kU/L, class 4 for values between 17.5 and 50 kU/L, class 5 for values between 50 and 100 kU/L, class 6 for values greater than 100 kU/L. Values greater than 0.70 kU/L were considered positive. Latex sensitization was defined as the presence of a positive result of RAST for latex. Latex allergy was defined as the presence of clinical manifestations to latex in sensitized subjects. Patients with positive history of allergic reactions to other allergens (implants, foods) were considered atopic.

Correlations between latex allergy and sensitization with several risk factors as early exposure, personal and family history of allergic reaction, sensitization to food allergens, atopy and number of surgical procedures were obtained.

The statistical analysis was carried out with the STAT-SOFT96. Comparison between different groups was assessed through Student T test. Statistical significance was considered a $p < 0.01$.

Results

Of 80 patients of the study, 32 patients (40%) had RAST > 0.70 kU/L for latex and they were

considered sensitized. Of them, 12 patients (37%) had shown clinical manifestations during exposure to latex (all had urticaria-angioedema syndrome, 4 associated with oculorinitis, 4 with respiratory symptoms), while 4 of them during surgical procedures. 50 patients had positive history of other allergic reactions and we considered them atopic; 40 patients (50%) had at least one allergic family member (parents, sisters or brothers, grandparents).

In allergic group 10 patients had the ventricular-peritoneal shunt, in the sensitized group 19 while 25 in the non-sensitized group.

Patients with latex allergy or latex sensitivity had undergone more operations than non-latex-sensitized subjects (mean value 6.8 vs 6.1 vs 2.5 surgical procedures). Allergic patients were about 12.8 years old vs. 12.1 years old in sensitized and 5.2 years old in the non-latex sensitized patients. 30/32 patients of sensitized group were operated during the first year of life.

In patients with latex allergy mean values of specific serum IgE were 39.1 kU/L (range 2.29-118 kU/L), in only sensitized group were 12 kU/L (range 0.98-38 kU/L) ($p < 0.01$).

PRIST values were associated with allergy and sensitization: patients with allergy had mean values of 584 kU/L, sensitized patients showed mean values of 498 kU/L and the non-sensitized patients had mean values of 79 kU/L ($p < 0.01$). The presence of other allergies in the family and/or atopy turned out significant for the sensitization: 75% of the allergic patients had at least one allergic family member, vs 70% of sensitized ones and 33% of the non-sensitized patients ($p < 0.01$); similarly both in allergic and sensitized groups we observed 60 % of patients with atopy but only 28% of patients in the non-sensitized ($p < 0.01$).

Regarding early exposure we observed that in allergic group 10 patients (83%) were undergoing to surgery in the first day of life, in the sensitized one 16 patients (80%) conversely in non-sensitized group only 31 patients (40%) ($p < 0.01$). All results are resumed in Table II and Figure 1.

Discussion

Spina Bifida is related with high rate of latex sensitization and allergy. Genetic propensity for latex sensitization was suggested^{1,2}.

The prevalence of sensitization to latex among children with SB is considered the highest prevalence in the general population. Other risk groups like health care workers and other multioperated patients don't have the same risk³⁻⁵.

Our study show that factors related with latex allergy and sensitization are early exposure, number of surgical procedures and atopy. 40% of our patients showed a sensitization to latex and 15% had clinical manifestations. The sensitization is not equivalent to a clinically expressed allergy but these patients are to be considered at high risk of anaphylactic reactions when contacts with products containing latex occur⁶⁻¹². Early exposure was related with latex sensitization and allergy. Shunt systems are latex free and we think in according with Buck's studies that exposure is probably due to glove powder left on the meninges¹³. The early exposure to an allergen like latex might consolidate the neonatal response, precluding the normal th2-th1 switch and inducing the future allergic responses. Furthermore it has been demonstrated that being born during pollen season increases the risk of polli-

nosis¹⁴⁻¹⁷. Number of surgical interventions is important for develop sensitization or allergy to latex. Intra-abdominal procedures are not correlated with latex sensitization while neurosurgical procedures appear more important to increase the risk of sensitization. This point emphasizes that a meningeal contact could be a predisposing factor in children with SB¹⁵⁻²¹.

Ventricular-peritoneal shunt is related with a higher risk of latex sensitization, probably because they undergo a significantly higher number of neurosurgical operations than patients without it, but on the contrary, the ventricular shunt per se does not seem to be an independent risk factor. Sex and age are not very important for latex allergy in these patients. More important appear the role of atopy and of history of allergy in the family of these patients²¹⁻²³. The sensitization to latex is a multifactorial condition in which genetic predisposition, early exposure and number of surgical procedures play a very important role.

In order to identify patients with higher risk of latex adverse reactions, it is fundamental the execution of an accurate allergological test as screening, a careful evaluation of any clinical evidence of latex allergy in all SB patients before each operation and a cart of latex products among the sanitary staff. The specific IgE dosage by the immunoenzymatic methods (RAST) has shown a sufficient sensitivity and specificity in order to evaluate the clinical reactivity of the latex sensitized children with SB when the symptoms are not well known.

The ideal solution for children with SB may be the setting of latex free operating rooms i.e. sterilized as regards the allergenic proteins of latex and used exclusively for the surgery of these children since the first day of life. It is important to underline that, as it has been showed in our

Table II. Comparison regarding risk factors between allergic, only sensitized and non sensitized patients.

	Total	Allergic	Sensitized	Non sensitized
PRIST mean (kU/l)	291	584*	498	79
RAST mean (kU/l)	3.5	39.1*	12	< 0.45
Early exposure	36.5	10 (83%)*	16 (80%)	31(40%)
Surgical treatments (mean)	4.6	6.8*	6,1	2.5
Atopic	50	60%*	60%	28%
Familiarity	291	75%*	70%	33

*: $p < 0.01$

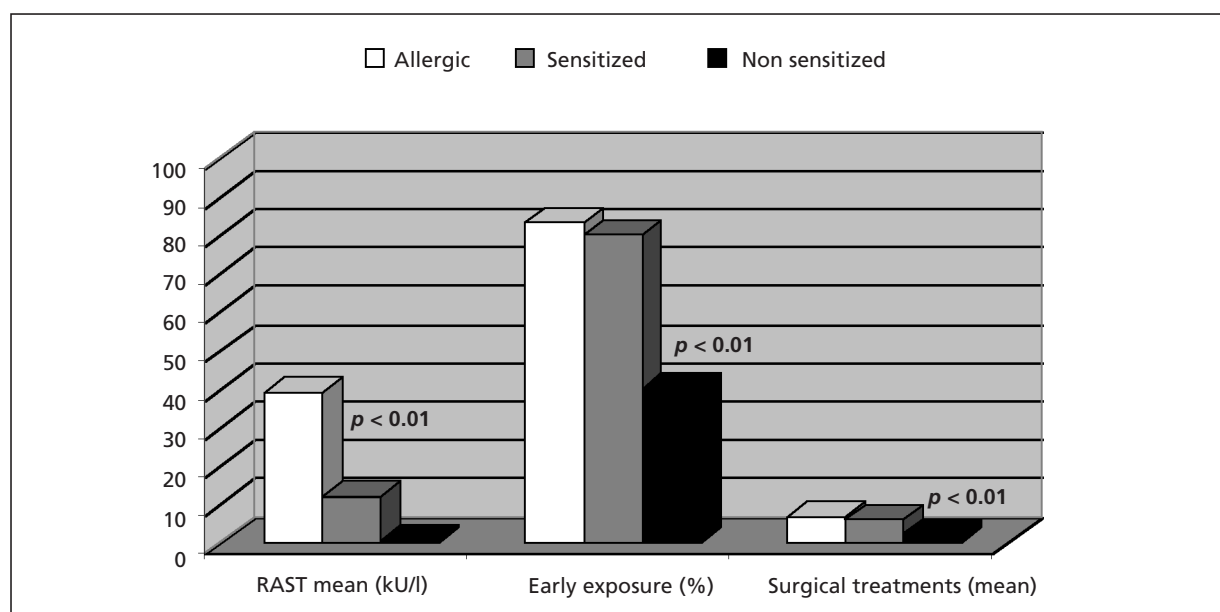


Figure 1. Correlation between latex allergy and risk factors.

study, not all the patients have become symptomatic during the surgical or diagnostic procedures. Therefore, the importance of prophylactic measures to avoid the exposure, not only in the sanitary environment, through the institution of latex-safe routes, but also in the daily life, to prevent potentially serious allergic reactions. For patients with latex allergy, to avoid risk of anaphylactic manifestations we have proposed sublingual desensitization. However, specific clinical trials need to confirm our data and demonstrate the utility of this practice²⁴.

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