

Natural rubber latex allergy: Clinical manifestations (including contact dermatitis) and diagnosis

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SUMMARY : Clinical symptoms of irritant (ICD) and allergic contact dermatitis (ACD) from gloves and immediate allergy to natural rubber latex (NRL) are sometimes indistinguishable. Therefore, proper diagnosis of NRL allergy is important. Skin prick testing is the method of choice for routine screening, in vitro tests are either less sensitive or less specific. The final diagnosis is made by skin, nose or bronchial challenge tests. Adequate prophylactic measurements are first possible when the diagnosis is clear. All rubber products can cause ICD, delayed type ACD and immediate type allergy to NRL. Irritation caused by gloves has been found to be about 10 times more common than allergic reactions. Although different types of products made from NRL are widely used, this paper will concentrate only on symptoms induced by protective gloves.

KEY-WORDS: Latex allergy – Skin prick testing – Challenge tests.

SYMPTOMS

Irritant contact dermatitis

Irritant eczema caused by gloves and powder in gloves may mimic allergy to gloves. The clinical picture may not be especially typical and therefore, skin testing must be used to exclude allergy. Frequent hand washing in connection to glove use, sweating under the gloves and occlusion itself can lead to skin irritation and eczema. Irritant dermatitis most often begins on the backs of the hands, but also other part of hands may be affected after longer wearing of gloves. Atopic persons are more prone to get ICD.

Allergic contact dermatitis

Allergic contact dermatitis is caused by chemicals added to the latex during manufacturing. The symptoms mainly limit to the site of contact beginning often from the backs of the hands. Sometimes eczema is also seen on palms and then on wrists and forearms. The border of dermatitis caused by gloves is often abrupt corresponding to the border of the glove in the forearm. The whole picture of an eczema can be observed, in acute cases more vesicles and papules with intense itching whereas scaling and rhagades and diffuse or patchy eczema are more prominent in chronic cases. Depending on the site of contact and the strength of the reaction, eczema may be present

also on larger areas. Face and especially eyelids are often affected, partly via transport through contaminated fingers, partly also via airborne contact with allergens. Eczema as such is not typical anyway to rubber chemicals, all kind of contact allergens can cause a similar picture. Sometimes protective gloves are impregnated by chemicals towards which one uses gloves and these materials can cause allergy through dirty gloves. Bacterial endotoxins and ethylene oxide used for sterilization of some gloves are rare sensitizers [1].

Immediate allergy to natural rubber latex

The symptoms of NRL allergy can vary from mild local to severe systemic reactions. NRL allergy is a typical example of contact urticaria syndrome with stages I to IV [4]. When 42 Finnish adult patients with latex glove allergy were analyzed, 2 did not have symptoms in the glove contact area, 10 % had only itching and exacerbation of hand eczema, 40 % presented with stage I of contact urticaria syndrome (localized urticaria on the area of contact), 17 % with stage II (generalized urticaria with angioedema), 21 % with stage 3 (urticaria with bronchial asthma, rhinoconjunctivitis, orolaryngeal and gastrointestinal symptoms), and 10 % with stage IV symptoms (anaphylaxis) [5]. In a large German series, all 70 patients with NRL allergy had contact urticaria; 51 %, rhinitis; 44 %, conjunctivitis; 31 %, dyspnea; 24 %, systemic symptoms; and 6 %, severe systemic reactions during surgery [2]. Rhinitis and asthma are mainly caused by airborne NRL exposure. Vandenplas studied 273 hospital workers and found occupational asthma in 2.5 % [10]. Chronic hand eczema may also be one manifestation of NRL allergy. The pathogenetic mechanism may be either type I protein contact dermatitis or delayed type allergy to latex proteins.

DIAGNOSIS

Delayed type allergy to rubber chemicals

Patch testing with a standard series and an additional rubber chemical series are used for diagnosis [1]. The standard series contains important rubber mixes like thiuram mix, and single chemicals, widely used in manufacturing of gloves. The rubber additive series increases the accuracy of patch testing. Possible delayed type sensitization to NRL should be diagnosed using pure lyophilized proteins as test material. Use of LATZ, the basic material for most dipped rubber products,

may lead to misinterpretation of the test result because of its not widely known thiuram content. Patch testing with actual glove pieces is important in confirming allergy to other ingredients in gloves not present in commercial series. Patch tests are performed by dermatologists.

Immediate allergy to natural rubber latex

The diagnosis of NRL allergy is based on clinical history, skin prick tests (SPT), estimation of specific IgE antibodies and, challenge tests [7, 8].

Careful history is important, but even a thorough history will not necessarily identify all sensitized persons. Ylitalo et al. tested 3269 children using SPT, and 55 (1.7 %) were positive. By retesting 33 (1.0 %) were positive with SPT, RAST and challenge test. One third of them were anamnesticallly totally negative to NRL [11]. In atopic patients with dry itchy skin, especially the skin symptoms of NRL allergy may easily be masked by skin irritation caused by glove powder and the occlusion effect of gloves. To guarantee proper diagnosis of NRL allergy, SPT series for common inhalant allergens should routinely include NRL allergen. In Tampere this has been the case since 1988 and because children with food allergy are mainly tested with foods and not pollens, we added NRL allergen in the food series in 1992. About 1 % new positive, relevant reactions have been found in 4708 and 3269 patients, respectively, [7, 11]. By definition, a SPT reaction with mean diameter of 3 mm is positive, but with small reactions (<5 mm in diameter) one should be careful, since they are not always repeatable. Especially when the clinical history is negative, a use test should be done to check the relevance.

Latex glove extracts (1:5 w/v) have been widely used as SPT allergens with satisfactory results. Since the allergenicity of latex gloves varies greatly, it is important to be able to choose the right glove for test material. An updated list on the allergenicity of latex gloves is available from National Agency for Medicines, Medical Devices Centre (P.O.Box 278, FIN-00531 Helsinki). Lack of standardized NRL allergens has been the major disadvantage of the SPT method. A standardized commercial NRL allergen has now become available in Europe (Stallergènes, S.A., France) [9]. In addition a few nonstandardized SPT preparations (ALK a/s, Denmark; Bencard, Mississauga, Ontario, Canada) are marketed in Europe and Canada. Recently we evaluated all these three preparations in 110 previously diagnosed NRL-allergic patients and compared the results to those obtained with our standard glove extract (Triflex, Baxter, lot 06 92L12DPGN). The sensitivities were 88 for Stallergènes, 54 % ALK, 92 % for Bencard

allergens, and 92 % for the reference glove extract [6].

At present, *in vitro* NRL-specific IgE antibodies are frequently estimated by using RAST or AlaSTAT. The sensitivities and specificities of these tests are not yet optimal, possibly due to deficiencies in NRL allergen source materials and their cross-reactivity with other IgE antibodies. Latex RAST seems to detect well highly allergic patients although one study reported anaphylactic reactions in NRL-allergic patients with negative RAST [3].

Use test with latex gloves or pulmonary or nasal inhalation tests are suggested to judge the relevant clinical allergy to NRL. It should always be performed when there is some discrepancy between

clinical history and SPT reactions. The use test with a glove has caused an anaphylactic reaction in a patient with severe hand eczema, and, for safety reasons, the use test should be started with a finger piece of a glove. The test has to be performed on a wet hand having a vinyl glove on the other hand to exclude dermographism. If one finger piece does not cause at least 2-3 wheals in 15 minutes, a whole latex glove is donned on a wet hand. To exclude delayed reactions, a wear test should be prolonged up to one week in normal daily use. To avoid false-positive results in milk-allergic subjects, the use test should be performed with a glove brand without casein [7, 8]. Bronchial challenge test by handling gloves or inhalation of aqueous extracts can identify persons with NRL-induced asthma [10].

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