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The Allergen Quick Test: A Simple Allergy Test to Prove Existing Sensitization

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Summary. We have developed a new method of allergy skin test. The main advantages of the allergen quick test (AQT) are its simple and rapid procedure and its usefulness in screening trials for everyday clinical practice. The equipment consists of a disposable test applicator which is pre-loaded with the allergen solution to be tested. The AQT was used on 3800 subjects in a screening trial, and has been performed by several ENT specialists in their clinical practices since 1979. Evaluation of the results obtained confirms that this developed method is safe, easy to use, and accurate.

Key words: Allergen quick test – Skin prick test – Diagnosis of inhalation allergy – Testing tool – Standardized prick test

Introduction

Although a significant percentage of the general population suffers from allergies [4–6, 13] the actual number of diagnosed and treated cases is relatively small. The reason for this discrepancy is presumably that the diagnosis of allergy is made only by a small number of physicians who are capable of directing the diagnostic studies needed and are thus able to carry them out. Since the introduction of specific therapies for treating grass pollen allergies (Pollinex, Tyrosine, Allergoid, Pollagen), the dispensing of specific immunotherapy has been made possible for every practising physician, especially since grass pollens are the most frequent type of inhalant allergy. However, the problems of ready diagnosis remain unsolved, since both the case history and at least a positive skin test are necessary before specific immunotherapy can be given. The aim of this study was to develop a new skin test which would have the following qualifications:

1. A single sterile vessel containing a small amount of allergen solution
2. Simple and rapid procedure
3. Easier to perform in anxious children than the usual skin tests

4. Suitable for diagnosis of specific cases as well as in screening investigations in all types of clinical practices
5. Economic in use

Materials and Methods

The "skin test applicator" was developed by Rosenthal [11] in collaboration with the Lederle Laboratories Division of the American Cyanamid Co. and is used for the Tine test. This applicator consists of a plastic handle which carries a metal plate with four 2-mm-long lances. This specialized arrangement ensures reproducible intracutaneous application of test extracts. The test applicator is loaded by dipping it into the allergen solution, and can be done manually or by machinery with brushes. The allergen solution utilizes a glycerine-water mixture which makes it adhere to the inoculation lances. Desiccation is prevented by the cap covering the pricking head. Thus, the durability of the allergen quick test (AQT) is only limited by the durability of the test solutions.

Typically, the skin test is applied to the medial side of the middle third of the arm or at its transition to the upper third. As in any prick test, areas with much hair growth or areas immediately above an easily recognized vein should be avoided if possible. The site used must be clean and dry, but should not be cleaned beforehand with alcohol or other disinfectants. The protective cap can be easily removed from the test tines without endangering sterility. The arm of the patient is then grasped with one hand by the tester so that simultaneously the skin is stretched slightly. However, this pre-tensing of the skin is only necessary in patients with pronounced subcutaneous fat. In doing the actual test, the tester uses his free hand to press the AQT into the patient's skin. This is done for about 1 s using moderate pressure. Four point-like impressions will be caused by the prick lancets and the allergen solution will glisten slightly in the light, indicating that the correct technique has been used. In patients with extremely thin skin, if the pressure used is too strong blood spots may appear. After being used once the test apparatus should be discarded. About 15–20 min after the test application, local skin reactions can be interpreted. To ensure the safety of the AQT in clinical testing, a series of preliminary studies were carried out to determine the required concentrations of the test solutions. Parallel comparative investigations using modified prick testing were performed on 500 patients with known allergic symptoms. In spite of the quadruple prick incisions made by the tine head, each test produced an adequate wheal which was comparable to the modified prick test. Furthermore, the safety and reproducibility of the method was confirmed by long-term observations during the course of routine following over a period of 1 year. To check reproducibility of all testing and to confirm the ease of clinical usage, the AQT was also performed by three different ENT specialists in their practices to confirm or refute suspect grass pollinosis since 1979. The durability of the prepared AQT stamp was also tested. One consignment was stored in the refrigerator (as directed), while a second consignment was stored at room temperature. Comparative tests were carried out after 3, 6, 12 and 24 months.

In screening tests on 3200 school children (aged 8, 12, and 16 years), an AQT was used with grass pollen extract and house dust mite. The skin responses to each test were recorded, a questionnaire was maintained, and grass and house dust mite serum IgE levels were also determined by means of RAST. These investigations were directed by two physicians who were trained as allergists. A similar screening study on 600 school children was conducted by an ENT specialist.

Results

The positive AQT skin reaction is comparable to the typical prick test and a skin wheal develops in the region of incision with surrounding erythema. Depending on whether or not only two or all four prick needles inject sufficient

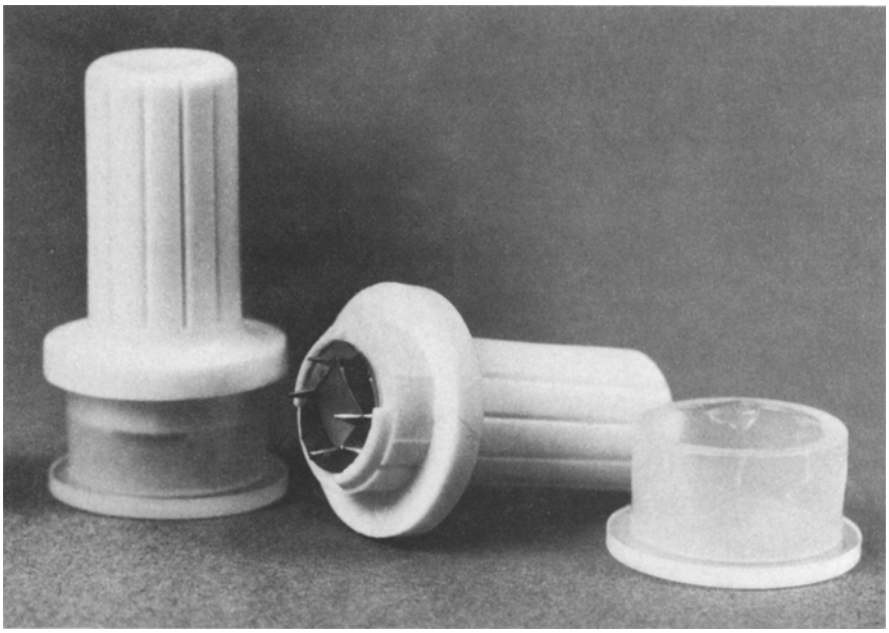

Fig. 1. The allergen quick test (AQT) set covered and opened for use

allergen solution, the main skin wheals become confluent to resemble a clover leaf or club-like bleb. Negative results leave hardly visible skin impressions or small flea-bite-like reactions.

Our best correlation with modified prick test was achieved after using Dome Laboratories' concentration of 4000 PNU grass pollen extract or with Beecham Pharma's 1.7% grass pollen test solution (Fig. 2). Higher allergen concentrations lead to unpleasant large wheals and are also associated with an increased risk of a systemic reaction occurring. With the recommended concentrations of the AQT used in the 9000 investigations carried out so far, no side effects were noted and all clinicians reported no difficulties with use or reproducibility of the method.

In testing for pollen allergy, case history was obtained the AQT performed; grass-specific immune therapy was then prescribed when positive results were recorded. In the tests for durability, no differences between the typical prick test reactions and the AQT were found when the AQT consignments were stored at 4°C or at room temperature for 12 months. However, when the tines were examined after 24 months (after the recommended expiration date), test pistons were found to be badly loaded and the prongs dried out. During the course of the screening tests on all children, a total of 7600 AQT tests were carried out. Due to the simplicity of the method, it was possible to complete these investigations within a short time. None of the children studied showed any fear of the test, as we have noted from time to time when using the modified prick test. Similarly, no excessive local allergic reactions were seen. Statistical evaluation of the skin test reactions comparing AQT with the RAST showed

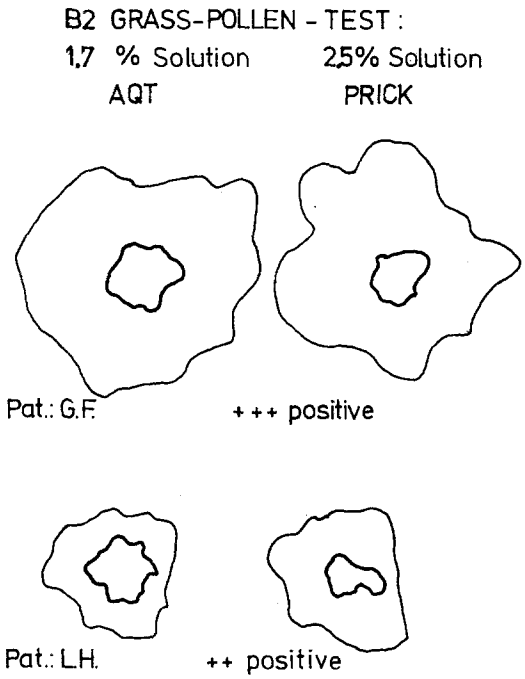

Fig. 2. Comparison of the reactions elicited in AQT and modified prick tests

AQT	RAST				
	0	1	2	3	4
0	89	9	3	1	0
1	23	6	6	2	0
2	7	5	2	5	4
3	2	4	8	16	13
4	0	3	7	22	82

$n = 319$

Table 1. A comparison of results obtained with RAST and allergen quick test (AQT) reactions in patients with definite histories of seasonal allergies

results equivalent to those reported when the modified prick test was compared with RAST [1–3, 7, 8].

Table 1 shows a comparison of 319 investigations on grass pollen senzitation in children who had complained of seasonal difficulties in the spring or summer months.

Table 2 shows the reactions of 863 children whose histories suggested possible allergy even though no complaints of seasonal symptoms were had. The

Table 2. A comparison of RAST and AQT reactions in patients with histories suggestive of allergies

AQT	RAST				
	0	1	2	3	4
0	286	50	4	0	1
1	156	45	6	4	3
2	49	23	44	12	6
3	4	9	29	31	8
4	4	3	20	28	38

$n = 863$

known high incidence of errors in the history questionnaires used (especially without medical instructions) is reflected in the large group of negative skin test and RAST reactions (classes 0 and 1). Weakly positive findings are recorded in class 2 patients, showing limited agreements between the skin test and RAST. In contrast, correlations of more than 90% were had in patients with unequivocally positive (classes 3 and 4) or negative findings. This was confirmed by statistical analysis of all data using the chi-square test. There is also significant agreement in our studies when the class 2 (weakly positive) reactions are included with the unequivocally positive findings ($P < 0.01$).

Discussion

All our basic requirements for the AQT were fulfilled, especially those regarding simplicity, speed and safety. Our findings are also comparable to those of other investigations [9, 12]. However, within the framework of comprehensive allergy diagnosis, the AQT is not suitable for use with various test solutions, such as the multi-test of Murphree et al. [10]. These latter tests have recently been developed in the United States and also use multiple prick heads. The multi-test requires very routine use as well as specific indications, and thus presents no alternative to the rapid and simple AQT. We have found that the AQT is well suited for use in clinical practice as a specific confirmatory test for allergens. The diagnosis of grass pollen allergy is particularly suitable for this technique. Similarly, house dust mite extracts or other common inhalation allergies can also be tested and thus allow early treatment to be given.

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