

Safety of bronchial allergen provocation in a children's out-patient clinic

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A total of 137 bronchial provocation tests (BPT) with allergen extracts were performed in an outpatient clinic. 110 were positive, 29 with late reaction and 81 without. The patients were observed for 6-8 h and discharged if they did not develop a late reaction. None of the discharged patients was admitted to hospital later, and the number of patients hospitalized was reduced by 80 %.

Key words: asthmatic children; BPT; outpatient clinic.

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CLINICAL ASPECTS.

Performing BPT in an outpatient clinic, only admitting to the ward patients with late reaction, was found safe and reduced the number of patients hospitalized by 80 %.

Clinical history, skin prick test and to some degree *in vitro* allergen tests are the most used methods of specific allergy diagnosis. Bronchial allergen provocation test (BPT), however, is still the final arbiter in the diagnosis of bronchial allergy (2, 5). BPT are used in clinics in experimental studies, before immunotherapy (1), and often when there is a doubt about the role of a specific allergen in the symptoms of an asthmatic.

Because of the risk of severe late reactions in children, challenges are normally performed under hospitalization (6). Since April 1986 BPT have been performed in our outpatient clinic, and the purpose of this paper is to describe the safety of this procedure.

PATIENTS AND METHODS

The patients were asthmatic children visiting an outpatient clinic, and BPT were performed either as part of a clinical investigation or for some patients with house dust mite allergy as part of a study of immunotherapy in asthmatic children.

Inhalation allergen extracts from cat and dog dander, house dust mite, and pollen from ALK, Denmark were used in increasing concentrations from 200 to 1000,000 SQ-E/ml. House dust mite extract from Dome-Hollister-Stier, England was used in concentrations from 50 to 1000 Allergen Units by RAST (AUR)/ml.

Bronchial provocation test

The patients and their parents were told to discontinue antihistamines, disodium cromoglycate, oral theophyllins, and inhaled steroids 48 h before the challenge. Inhaled bronchodilators were allowed until 4 h before. No patients were given oral steroids. On entering the clinic, chest auscultation and a prechallenge lung function measurement were performed. Signs of bronchospasm or lung infection were exclusion criteria. FEV₁ should be > 60 % of predicted value.

The BPT was carried out using nebulized aqueous allergen extracts in increasing concen-

trations inhaled from a face mask with an Opti-mist nebulizer, system 22. The volume of extract was 5 ml, nebulized to the patient by a constant airflow of 5 l/min with a calculated nebulized output of 0.135 ml/min. The reproducibility of this procedure has been evaluated in a separate trial. Under identical conditions, BPT with house dust mite extract was performed twice, with an interval of 2 weeks. There was no difference in bronchial sensitivity threshold dose between the two provocations, evaluated by Wilcoxon matched-pairs signed rank test ($P > 0.3$) (7).

Challenges were stopped if FEV_1 was $\leq 80\%$ of prechallenge value, or if there were clinical signs of bronchospasm on auscultation. Inhalations were started each time with saline as a negative control. Inhalations of the greatest concentration of an allergen without significant fall in FEV_1 and without bronchospasm were noted as negative challenges.

After BPT, FEV_1 or PEF were recorded every $\frac{1}{2}$ h for the next 6–8 h to detect any late reaction. If the BPT was negative or there was no late reaction after at least 6 h the patients were discharged from the clinic and told to continue measuring PEF at home every 4 h and to take their usual medication supplemented, if necessary, by inhaled bronchodilator. Patients with late reactions were admitted to the ward for observation and treatment.

RESULTS

From April 1986 to August 1989, 137 BPT were performed in 69 patients aged between 5 and 17 years (median 11.3 years): 99 challenges with house dust mite, 16 with dog dander, 20 with cat dander and 2 with grass pollen. Twenty-seven of the BPT were negative. A total of 110 challenges were positive, 81 without and 29 with a late reaction. All patients with late reactions were challenged with house dust mite extract.

After 36 BPT the patients were admitted to hospital: 28 with late reaction; four with questionable late reaction; one because of concomitant disease, and three because of a long distance between home and clinic. One patient with a late reaction was discharged after 7 h, because his parents did not want him admitted to hospital. All but one could be discharged the day after BPT with habitual lung function and medication. One patient did not obtain acceptable lung function the first 4 days after challenge. None of patients discharged was readmitted. The fall in FEV_1 immediately after a positive provocation was significantly increased in patients with late reactions compared with patients without late reaction. ($P = 0.00035$ Mann-Whitney test) (Fig. 1.).

DISCUSSION

Fatalities and near-deaths can occur with BPT. This means that BPT should never be regarded as a routine tool, but rather as a final test if information from a provocations test is needed for scientific reasons or for convincing the patient or the family of the presence of allergy to a given allergen. There are differences in risks between subjects, between allergens, and between methods (2). We found that all patients with late reactions had been provoked with house dust mite extracts, but the number of tests with other allergens was minimal and the strength of the allergens is not necessarily comparable.

Standardization of bronchial inhalation tests has improved the comparison of results obtained at different times and clinics (4). Standardization involves control of both technical and

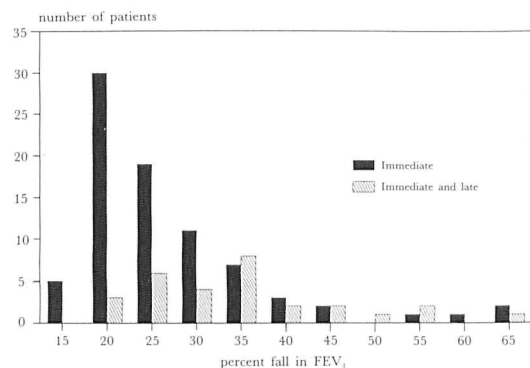


Fig. 1. Immediate reactions in patients with and without late reaction.

non-technical factors. Technical factors are those concerned with allergen extracts used, methods of aerosol generation, and measurement of response; non-technical factors include airflow obstruction, medications, recent respiratory infection, and recent allergen exposure (4).

Performing BPT during hospitalization allows control of medication and allergen exposure 24 h before the challenge (6), but by careful chest auscultation and prechallenge lung function test it is possible to eliminate this problem in an outpatient clinic.

Reports of late reactions to BPT have varied. Warner (6) found that more than 70 % of children challenged with house dust mite had a late reaction, and that the occurrence of late reactions correlated well with the presence of frequent asthma attacks. As in this study, he also found that the immediate reactions were of short duration and almost always resolved spontaneously.

Thus, we suggest that further observation and treatment 6–8 h after BPT is only necessary in patients with late reactions. We have shown that BPT is safe under controlled conditions with the mentioned allergens, decreases hospital admissions by 80 %, thus benefiting the patients and reducing the costs of bronchial allergen

provocation tests. It does not, however, imply that BPT is a completely safe procedure if widely applied in patients with all types of allergies, various degrees of bronchial reactivity and severity of asthma.

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