

Delayed asthmatic response to inhalant allergen: cantharidine beetle, case report

M. P. S. MENON and A. K. DAS

V.P. Chest Institute, Delhi University, India

Summary

A case history of an asthmatic patient who developed delayed responses to intradermal and inhalation provocation tests with whole body allergen of a common beetle (cantharidine) is presented. The response was maximal at 48 hr after the test and it took almost a week for complete resolution. Prior administration of sodium cromoglycate failed to inhibit this response, whereas corticosteroid treatment completely inhibited it. An asthmatic response which appears 48 h after inhalation challenge with an insect allergen is a new variety and the mechanism needs study.

Introduction

Isolated late asthmatic responses (Type III) and dual asthmatic responses (Type I and III) can be provoked by many inhalant allergens (Hargreave & Pepys, 1972; Booij-Noord, Orie & deVries, 1971). However, it is not common for an asthmatic response to occur 24 hr or more after the inhalation challenge. The present report describes such a delayed response to an insect allergen (cantharidine beetle) in a female patient.

Materials and methods

Skin tests

Intradermal tests were done with sixty inhalant allergens including the whole body allergen of the cantharidine beetle. An aqueous solution (0.02 ml of 1:500) of the allergens was used, and the same volume of phosphate-buffered saline was injected as control. Results were read within 20 min and then on at hourly intervals for the next 12 hr, and at 24, 48, and 72 hr.

An intradermal test with similar quantity of cantharidine beetle allergen was repeated at a later date, after inhalation of sodium cromoglycate (20 mg q.i.d.) for 2 weeks. Similar tests were repeated 2 months later, after 1 week's administration of prednisolone (5 mg b.d.).

Correspondence: Dr M. P. S. Menon, V. P. Chest Institute, University of Delhi, Delhi-110007, India.

Body temperature, eosinophil and white blood cell counts

Mouth temperature was recorded before, at 30 and 60 min after each provocation test, and then at every 4 hr for the next 72 hr. Peripheral blood leucocyte counts were made before and at 4, 8 and 24 hr after the test.

Inhalation provocation test

Phosphate-buffered saline (0.2 ml) was used as control. The same volume of allergen solution (1:50) was used for the inhalation test as described previously (Shivpuri & Aggarwal, 1969). FVC and FEV₁ were measured before the test, 2 min and 5 min after it, and at every 10 min for the first hour. They were also recorded every hour for the next 8 hr, and then at 12, 24, 48 and 72 hr. The inhalation provocation test was repeated at a later date, after prior inhalation of sodium cromoglycate (DSCG) through a spinhaler (20 mg q.i.d. for 1 week). A similar test was made 1 month later after prior administration of prednisolone for 1 week (5 mg b.d.).

An X-ray of the chest was taken 48 hr after the inhalation provocation test.

Case history

The patient, a 22-year-old female student had suffered from asthma and rhinitis for 3 years. She had no previous history of urticaria, eczema or drug allergy. Her grandfather was an asthmatic. Respiratory function tests on admission are shown in Table 1.

Table 1. Results of respiratory function tests

	Observed	Predicted (%)	After exercise
FVC	3322 ml	120.7	3290 ml
FEV ₁	2438 ml	100	2418 ml
FEV ₁ /FEV(%)	73.2	85 ± 5	73.5

Chest X-ray, haemoglobin, total and differential leucocyte count, urinalysis and stool were normal. Skin tests with sixty inhalant allergens gave negative immediate reactions.

Results*Control*

Intradermal as well as inhalation provocation tests with buffered saline did not cause any significant reaction. (Fig. 1).

Intradermal test

Intradermal test with cantharidine beetle allergen did not elicit any significant immediate response, but a weal, 30 × 30 mm, appeared at the site of injection 48 hr afterwards. This reached a maximum of 45 × 45 mm at 72 hr and resolved gradually in 8 days.

A similar test, 1 month later, after prior administration of DSCG, showed a 30 × 30 mm induration at 48 hr and 50 × 50 mm at 72 hr, but a test performed 2 months later after the administration of oral prednisolone was negative.

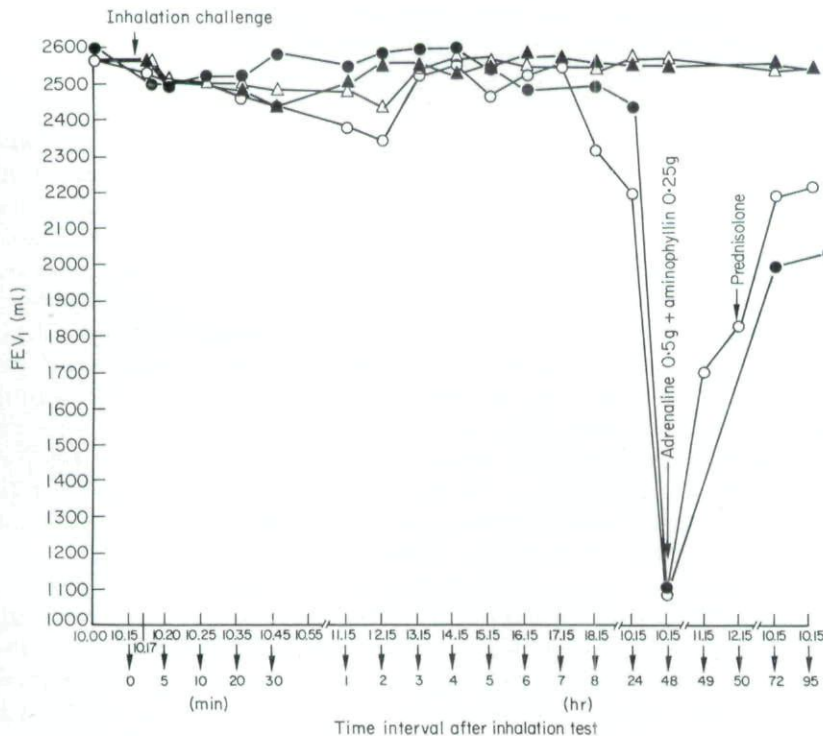


Fig. 1. Effects of disodium cromoglycate and prednisolone on delayed asthmatic response due to inhalation of cantharidine beetle allergen. Buffered saline, ▲; cantharidine beetle 1:500, ○; cantharidine beetle after prednisolone, △; cantharidine beetle after DSCG, ●.

Allergen inhalation test

The patient was asymptomatic when the tests were performed. A gap of more than 2 weeks was kept between tests. The FEV₁ fell by 14.3% from the basal value of 2562 ml 24 hr after the inhalation of cantharidine beetle allergen aerosol. The patient became extremely breathless 48 hr after the test and her FEV₁ at that time was 1098 ml (−56.1%). The FVC also fell from the basal value of 3385 to 1677 ml. Administration of intravenous aminophylline (0.25 gm) and injection of adrenaline (0.5 ml) produced a transient improvement, but the FEV₁ was still 26.8% below the basal value (1830 ml) at 50 hr and hence 8 mg of dexamethasone was administered intravenously followed by oral prednisolone (Fig. 1). She became symptom-free 72 hr after the test but it took almost 1 week for the FEV₁ to return to the basal value.

When tested after prior administration of DSCG as mentioned above, the FEV₁ fell by 58.1% at 48 hr but after administration of 5 mg prednisolone twice daily for 1 week, there was no significant response throughout the observation period (Fig. 1).

Oral temperature, peripheral blood leucocyte count and chest X-ray did not show any significant changes after the inhalation tests.

Discussion

Dual asthmatic responses as well as isolated late asthmatic responses occurring 4–8 hr after allergen inhalation tests are well known (Hargreave & Pepys, 1972; Booi-

Noord *et al.*, 1971; Robertson *et al.*, 1974; McAllen, Assem & Munsell, 1970; McCarthy & Pepys, 1971; Davies, Hendrick & Pepys, 1974) but it is not common for an asthmatic response to occur 24 hr or more after the inhalation challenge. Such a response corresponds in its time of onset to a Type IV hypersensitivity reaction.

There are reports of late asthma developing 48 hr or more after exposure to certain allergens (Pepys, 1969). Early asthmatic responses to cantharidine beetle allergen have also been observed (Shivpuri & Shali, personal communication), but there is no report of an asthmatic response to any inhalant allergen which occurs repeatedly and reproducibly only 48 hr after the inhalation test. Delayed (tuberculin type) skin test responses to inhalant allergens have been reported (George *et al.*, 1967), but the authors did not report delayed asthmatic responses to inhalant allergens in their cases. Asthmatic responses lasting for many days, even weeks, following a single exposure to pollen allergen have been noted by us. After exposure to enzymes of *B. subtilis*, asthmatic reactions have shown marked periodicity in recurring at similar times on subsequent days as reported by Mitchell & Gandevia (1971). The positive test response obtained 1 month after the initial test and the asymptomatic state of the patient before the repeat test obviate the possibility of spontaneous attacks, as well as the type of response observed by Mitchell & Gandevia (1971).

It can be seen from Fig. 1 that bronchodilators and DSCG had little influence on the delayed asthmatic response, whereas corticosteroids exerted a remarkable inhibitory effect. These findings tempt one to consider the responses obtained in this patient as a Type IV hypersensitivity reaction, but until the underlying mechanism is elucidated it would be premature to regard them as cell-mediated tuberculin-type reactions.

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