

The diagnostic value of detecting eosinophilia of nasal secretions in allergic rhinitis

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Summary

Nasal mucus eosinophilia was found in 92 per cent of adults with active hay fever. After an initial period of gaining experience in the method of collecting mucus, this was found to be a simple cheap method of demonstrating an allergic component in the genesis of rhinitis. This test could be employed for detecting the relationship of allergic factors to chronic respiratory tract disease in childhood and in adults.

Introduction

The value of detecting eosinophils in nasal secretions amongst patients with asthma (Bryan and Bryan, 1959), and non-seasonal allergic rhinitis (Murray and Anderson, 1969) has already been reported, the latter finding a prevalence rate of 32 per cent of eosinophilia in their predominantly paediatric population. Most textbooks on allergy (Tennenbaum, 1972) comment on the frequent presence of eosinophils in nasal mucus of seasonal allergic rhinitis patients in the U.S.A.

However, the test is little used in routine practice in this country, and its application to a group of adults with well documented seasonal allergic rhinitis to grass pollen is described, in order to reawaken interest in this investigation.

If the test is recognised as valuable in seasonal allergic rhinitis, there are obvious indications for its use in other presumed allergic disorders of the respiratory tract; nasal mucus can be obtained fresh and with relative ease, but sputum is much more difficult to handle with consequent loss of cytological detail. The technical problems encountered in the performance of the nasal smear test are described.

Method

Patients with a known history of hay fever (allergic rhinitis confined to the months of June and July) were selected from a general practice comprising 5,400 patients in semi-rural Surrey. They were severe enough to have received antihistamine tablets and disodium cromoglycate (as powder or solution) for at least two years. They had immediate positive skin prick tests to grass pollen, and as a group, had raised serum IgE levels indicative of ability to mediate such an immediate reaction (Manners and Ezeoke, 1973). Patients with severe perennial rhinitis, asthma or eczema were excluded.

A pilot study to test nasal swab collection was performed in 1971; the swabs were transferred dry to the laboratory where a Leishman stain was used to detect eosinophils; most of the swabs were collected in July. Eosinophilia was considered present if eosinophils were the dominant cell of an at least mild inflammatory exudate; most of the cells in the mucus were shed epithelial cells. In 1972 the swabs were collected in the third week of the hay fever season and were spread immediately on a glass slide and fixed with methanol. In 1973 swabs were collected between four and seven days from the onset of

the grass pollen season; the latter was defined as the first day on which the grass pollen count exceeded 50 grains per cu. mm.

A smaller series of swabs was collected from patients with common colds, either in winter or summer, and in asthmatics with or without concurrent rhinitis.

In 1972 the swabs were passed to the depth of the midnasal cavity; in 1973 swabs were passed through the nasal cavity to the posterior nasopharyngeal wall, rotated and then withdrawn firmly against the lateral aspect of the cavity. All swabs were collected and examined microscopically by me. A chromotrope 2 R stain was used as a selective stain for eosinophil granules. The smears were also assessed for abundance and type of epithelial cell; squamous cells come from the nasal vestibule while columnar cells come from the true nasal cavity. Hence an adequately taken smear contains numerous clumps of respiratory tract columnar epithelial cells.

Results

In the pilot study, 42 nasal smears were examined; adequate material was found in ten, of which six showed eosinophils, in which cells were ruptured and eosinophil granules scattered. Thus eosinophilia was found in 15 per cent of hay fever subjects. The next summer (1972) adequate material was obtained in 38 per cent of swabs collected from 58 individuals. Eosinophilia was then found in 35 per cent of patients examined.

TABLE 1
NASAL EOSINOPHILIA IN VARIOUS GROUPS OF PATIENTS

<i>Group examined</i>	<i>Number patients examined</i>	<i>Adequate material in nasal smear</i>	<i>Eosinophilia present</i>
Adults, hay fever, 1972	58	38	35
Adults, hay fever, 1973	52	88	90
Hay fever, children 1973	15	66	60
Acute asthma with rhinitis 1973	38	62	50
Acute asthma without rhinitis 1973	40	70	33
Catarrhal child, 1973	27	66	28
Common cold, all ages Summer, 1973	21	95	20
Common cold, all ages Winter, 1972-3	22	86	5
Normal patients, 1973	34	91	3

In June 1973, adequate material was collected in 88 per cent of swabs from 52 subjects, and 90 per cent (47 persons) showed eosinophilia. Where sneezing and profuse rhinorrhoea were the dominant feature, 98 per cent of swabs were positive; when blocking of the nose was the dominant symptom, and this was chiefly a problem from 20.00 hours to 08.00 hours, eosinophilia was present in 76 per cent. Swabs had been collected from all 52 in early April 1973 and eosinophilia found in six per cent.

Preliminary study of other groups showed eosinophilia in five per cent of 22 patients with a common cold in the winter of 1972-73, and in 20 per cent of 21 patients with a common cold in the summer of 1973. Eosinophilia was also demonstrated in 50 per cent of 38 episodes of acute asthma with rhinitis and in 33 per cent of 40 episodes of acute asthma without rhinitis. Eosinophilia was also found in 28 per cent of 'random' nasal swabs collected from 27 'catarrhal children.' One of 34 normal patients, without current nasal symptoms and a negative history of nasal disease, had eosinophilia—hence an unmatched 'control' rate of eosinophilia was three per cent.

Discussion

The group of hay fever patients examined have well defined seasonal allergic rhinitis due to grass pollen because of their seasonal symptoms related to the grass pollen count, positive skin prick tests to grass pollen, and their high serum IgE levels. Hence the high prevalence of eosinophilia indicates that this is a useful test for detection of purely allergic rhinitis.

The high positive eosinophil rate is explained by:

- (1) Careful selection of the group for study,
- (2) Increasing expertise in collecting adequate nasal mucus for examination,
- (3) Immediate spreading and fixation of mucus,
- (4) Using a selective stain for eosinophil granules,
- (5) Timing collection of mucus within one week of onset of seasonal symptoms,
- (6) Adequate nasal challenge by high and standard grass pollen count.

Once the eosinophil test had been established as a method for detection of allergic seasonal rhinitis, it could be applied to other conditions involving the respiratory tract and suspected of having an allergic factor of immediate hypersensitivity type. Hence in 1972-3 the test was performed in patients with perennial rhinitis and asthma, in which group nasal eosinophilia was found in about one third.

The cause of the catarrhal-child syndrome has long been debated, and the presence of nasal eosinophilia from random swabs in 28 per cent suggests that allergic rhinitis may be an important factor. It has been suggested (Colley *et al.*, 1973) that frequent respiratory tract 'infections' in childhood may predispose to chronic bronchitis in adult life. Since the present paper suggests that many summer colds and catarrhal children have eosinophilia (and by inference allergic rhinitis) and since exacerbations of asthma coincident with rhinitis often show nasal eosinophilia, allergic respiratory tract disease in childhood should be considered not only as a precursor of adult asthma, but also of chronic bronchitis. Further studies on nasal eosinophilia in common colds, catarrhal children, asthmatics and bronchitics should be performed.

Acknowledgements

My thanks are due to my partners, Drs P. R. Grob and G. P. J. Beynon for their unstinting encouragement, to Mr P. Jenkins for cytology staining methods, and to Fisons Limited for their assistance.

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