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The diagnostic value of a cytogram in rhinopathology

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SUMMARY

Chronic and recurrent rhinitis is a very common complaint in E.N.T. practice. For the differential diagnosis we use a battery of investigations including cytological examination of the nasal mucus. It was attempted to establish a correlation between the observable pathology of cellular elements from a nasal smear and the different types of pathologies, i.e.: specific allergic or atopic rhinopathy, nasal polyposis, coryza, and sinusitis.

The cell types included in this study are: neutrophils, eosinophils, ciliated columnar cells with and without well preserved cilia and goblet cells. This study included about 500 nasal smears from about 360 patients. A group of control patients without nasal complaints was included. The results demonstrated that investigation of local nose secretions is helpful in the differential diagnosis of exudative rhinopathy.

INTRODUCTION

Nasal obstruction with discharge and sneezing is a frequent complaint in E.N.T. practice. Very often differential diagnosis will be a problem, so we attempted to investigate whether cytological examination of the nasal mucus could help in making a diagnosis.

In earlier days, the main purpose of cytological nasal investigations was to detect malignant diseases. Nowadays, according to various authors (Fischer-Pap, 1970; Holopaïnen, 1976; Kellner, Ludwig, Mayer, 1970; and Manners, 1974), it offers interesting perspectives for the study of exsudative diseases. In 1889, Gollash found eosinophils in the nasal secretion of an asthmatic patient. The correlation between clinical allergy and eosinophilia in the nasal mucus was demonstrated by Eyerman as early as 1922. But the real pioneers using rhinocytology as a differential diagnosis technique in the various cases of exudative rhinopathy were Bryan and Bryan (1974). They tabulated the relative numbers and types of cells found in reports which they called "cytograms".

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MATERIAL AND METHODS

The purpose of the procedure is to collect a sufficient quantity of material in a non-irritative manner.

Various techniques are currently used, such as:

1. cotton swabs;
2. aspiration;
3. nasal washing;
4. the blowing of mucus on a glass slide or on a paper strip covered with Carbowax;
5. the introduction of a cotton wool probe into the meatus media for a period of five minutes.

We preferred the first method. The use of a cotton swab is the most convenient methode to obtain a cytological sample from the nasal cavity. With a gentle pressure, we moved the cotton swab from the back of the nasal floor to the front. The secretion was then transferred onto a slide with a gentle turning motion. Immediate fixation was obtained with a cytospray. This technique gave good results. Out of 360 smears, 30 (i.e. 8%) could not be evaluated because of insufficient volume and/or badly preserved material.

Staining

First, we use various staining procedures such as those of Papanicolaou, Wright, Giemsa, May-Grünwald and P.A.S. The most satisfactory was the Papanicolaou stain that could be obtained automatically by a Cyto-Tek® Stain Pak. The other methods were turned down because they could not be obtained routinely and would have been too time-consuming.

Microscopic examination

A screening was carried out on a magnification of 10×10 after which individual fields were examined with magnifications of 10×25 and 10×40, and oil-immersion.

Patient selection

A total of 360 patients took part in this study and were divided into 4 groups:

Group A: Specific allergic rhinopathy
- A_1: Seasonal rhinitis (35 patients)
- A_2: Perennial rhinitis (35 patients)
- A_3: Perennial rhinitis with seasonal exacerbations (57 patients)

Group B: Aspecific allergic rhinopathy
- B_1: No anatomical obstruction (68 patients)

B_2: Anatomical obstacles, such as septal spine and septal deviation (69 patients)

B_3: Nasal polyposis (16 patients)

Group C: Coryza, sinusitis (54 patients)

Group D: Control group (25 patients)

Patients included 181 women and 179 men from 6 to 58 years of age, with an average age of 25. The definition of an atopic patient was formulated before the examination, using 7 parameters:

1. history including the classic triad of nasal blocking, nasal discharge and sneezing;
2. anterior rhinoscopy with aspect of mucus and secretions;
3. blood eosinophilia;
4. total IgE level;
5. specific IgE level;
6. skin tests;
7. nasal provocation tests.

The highest value (i.e. 2) was assigned to parameters 1, 5, 6 and 7. Parameters 2, 3 and 4 were valued at 1.

A patient was considered atopic when he or she scored 6 out of 11 at least. All smears from patients of groups A, B and C were taken while complaints were present. Control group D included patients who had no acute or no chronic nasal complaint and in whom anterior rhinoscopy was normal.

Cell examination

Four cell types were investigated:

1. eosinophils;
2. neutrophils;
3. columnar epithelial cells;
4. goblet cells.

Mast cells that were found by Bryan and Bryan (1974) especially in cases of food allergy were not searched for, as patients with a food allergy were not included in this study. Eosinophils were easy to recognize from their bilobed nucleus and the presence of granules in the cytoplasm.

Columnar epithelial cells are characterized in profile by their columnar or prismatic shape ending in a tail. The nucleus is oriented towards the tail end. Cilia with a terminal plate are present. During degeneration, the cilia are often lost, leaving the cell with just a terminal plate. Goblet cells are mucus-producing columnar cells.

Because of the irregular division, it is difficult to quantify the cell material. We used an interpretation of cytology based on the classification of Bhandari and Baldwa (1976), i.e.

0 no cells;
+ few cells;
++ many scattered cells;
+++ many scattered cells and clumps;
++++ many scattered cells and large clumps of cells.

The columnar cells were rated as ciliated or not ciliated. This semi-quantitative method requires that one and the same person reads the smears and checks with the nasal pathology.

RESULTS

Table 1.

	group A	group B_1+B_2	group B_3	group C	group D
number of patients examined	127	137	16	54	25
neutrophils	1.70	1.64	1.81	2.04	1.80
eosinophils	1.25	0.15	1.43	0.21	0.08
columnar cells ciliated	2.07	1.95	2.31	1.82	2.48
	24%	23%	62%	23%	32%
goblet cells	0.85	0.79	0.62	0.53	1.52
unable to evaluate	7	16	0	7	0

Each cellular element having been assigned a value between 0 and 4, we calculated the mean value for each element in every group. As far as the cilia were concerned, only their presence or absence was noted and subsequently their percentage of occurrence was determined.
Comparing cellular elements in the different groups, we searched for a significant difference using a t-test of 99,8%.

DISCUSSION

1. According to Holopaïnen (1976), a normal cytogram consists of a predominant quantity of epithelial cells, some goblet cells and few hematogeneous cells, such as neutrophils and eosinophils.
   These results correspond largely to our control groups where we found a predominant quantity of columnar cells, 32% of which had well preserved cilia. On the other hand, we found a great number of goblet cells in our control group. Approximately twice as many as in all other groups. With respect to the hematogeneous elements, we found a good quantity of neutrophils and a significantly small quantity of eosinophils.

2. Bryan and Bryan (1974) made a cytogram for atopy and coryza on the following basis:
   Atopy: - distinct increase in nasal eosinophilia;
   - distinct increase in the quantity of goblet cells;
   - loss of cilia.
   Coryza: - distinct increase in neutrophilia;
   - cilia are intact during peak period of cold.

   With the atopic patients (group A), we found a significant increase in nasal eosinophilia, but no increase in the number of goblet cells. By contrast, our control group had more goblet cells. In 24% of the cases, the columnar cells had well-preserved cilia, which is less than the control group, but not less than the non-atopic group (group B) and the coryza group (group C).
   In group B of aspecific allergic rhinopathy, a remarkable feature was that group B_3 (polyposis nasi patients) did not belong to this group. In B_3 we found a significantly high number of eosinophils and a great number of columnar epithelial cells, 62% of which were ciliated. In the C group (coryza and sinusitis), the increased number of neutrophils was striking, but the cilia were as badly preserved as those in groups A and B, i.e. in 23% of the cases. The goblet cells were present in small number.

CONCLUSIONS

1. Rhinocytology is useful as a diagnosis for atopy, but cannot exclude atopy if it is negative.
2. Eosinophils are the most commonly found, easily identified, most abundantly seen cells associated with atopical rhinopathy, although they will occasionally appear in a number of non-atopical rhinopathies and even in large numbers in nasal polyposis.
3. The nasal smear, carried out according to modern techniques, allows us to orientate and establish a diagnosis when other clear evidence is either insufficient or lacking.
4. Rhinocytology offers so many important advantages that further research in this direction certainly is recommendable.
   Among its advantages are the facts that:
   a. rhinocytology is painless and not traumatizing so that it can be performed even on children;
   b. it is repeatable;
   c. easy access is available;
   d. preservation of samples is easy.
5. The cytogram of the nasal mucosa is a welcome addition to the differential diagnosis of the exudative rhinopathy. Improvement of the collection technique

and staining, as well as a standardization of the quantification of the cell material are necessary to turn the rhinocytological investigation into a fully dependable diagnostic tool.

RÉSUMÉ

La rhinite chronique et récurrente est un problème fréquent en O.R.L. Afin d'établir un diagnostic différentiel, nous avons employé une série d'investigations comprenant entre autres l'examen cytologique des sécrétions nasales. Le but de l'étude était de démontrer une corrélation entre l'observation des divers éléments cellulairs en provenance d'un frottis de nez et les différents types de rhinopathies.

Les différents types cellulaires étudiés étaient les polynucléaires neutrophiles et éosinophiles, les cellules ciliées et les cellules calciformes.

Cette étude englobait environ 500 frottis de nez en provenance de 360 patients. Un groupe de contrôle, sans plaintes au point de vue nasal, était inclu dans cette étude. Les résultats ont démontré que l'examen cytologique des sécrétions du nez est d'un apport non négligeable dans l'établissement du diagnostic différentiel des rhinopathies exudatives.

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