Rhinology, XV, 121-128, 1977

Histology of nasal polyps of different etiology

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SUMMARY

The aim of the present study is to elucidate the correlation between etiology and histology in nasal polyps with special regard to cystic fibrosis (CF).
Nasal polyps from 15 children with CF and a control group of non-CF polyps from 15 adult patients were examined by light-microscopy. The histological evaluation was carried out on a blind basis in order to avoid bias.
Among the parameters used, the tissue eosinophilia proved to be the most valuable factor in the differentiation between CF and non-CF polyps, as only few eosinophils were found in the CF-polyps.
The polyp glands were few and generally pathological. Some characteristic abnormalities in the grandular morphology are apparently more common in CF polyps.
It is concluded, that the histological examination of nasal polyps is of importance for the correct classification of the patient, but the diagnosis of CF cannot be made based on microscopy of polyps. Further studies including blinded histological examination of nasal polypous tissue might contribute to a more differentiated diagnose of nasal polyposis.

INTRODUCTION

NASAL polyps (nasal polyposies, benign nasal polyps, multiple nasal polyps) are round, smouth, soft semi-translucent, yellow or pale glistering structures, usually attached to the nasal or sinus mucosa by a relatively narrow stalk or pedicle. They commonly arise from the ethmoidal sinuses and project into the nasal cavity and tend to be bilateral and multiple.

Although nasal polyposis are a common condition the exact explanation of polyp formation is still unknown. Infection, allergy, vascular derangement of the nasal mucosa are probable etiological factors together with mechanical obstruction. Either of these factors may be of importance in the development of nasal polyps in patients with cystic fibrosis (CF). Nasal polyposis are found in 15-25% of children with this disease (Paulsen and Hertel, 1973 and Mygind et al., 1977). Histologically the polyp tissue consists of a very oedematous connective tissue covered by a pseudostratified ciliated epithelium with goblet cells. Squamous metaplasia often occurs in areas exposed to air or mechanical action. The tissue contains only few blood vessels and various amounts of glands, more or less dilatated by secretion. Cellinfiltration is found in varying degree.

The eosinophil leucocyte is often the dominant cell, but also plasma cells and neutrophil leucocytes are present and lymfocytes may be seen in accumulations. In the literature it is generally claimed, that the histological picture of the nasal polyp tissue is the same regardless of the etiology. Although several authors have dealt with this question, especially at examination of nasal polyps from patients with cystic fibrosis (CF) (Schwachmann et al., 1961, Magid et al., 1967, Neely et al., 1972, Taylor et al., 1974 and Oppenheimer and Esterly, 1975), no controlled quantitative study on the histology of nasal polyps seems to have been performed.

The aim of the present study is to elucidate whether the histological picture of nasal polyposis can be correlated to etiology. For that purpose nasal polyps from patients with CF were compared with a control group of polyps from "non-CF" patients in a blind histological examination.

MATERIAL AND METHODS

Nasal polyps (5-12 mm in size) were removed from 15 children with CF, 10 were boys and 5 girls. The mean age was 9.3 years (range: 5-14 years). In all cases was the diagnosis confirmed by a positive sweat test.

The control group comprises adult patients with severe nasal polyposis. 11 were men and 4 women. The mean age was 40 years (range 25-65 years). A large biopsy (4-8 mm in size) was taken from a nasal polyp prior to the start of a controlled topical steroid treatment. Only polyps from patients who benefited from the treatment were used. In these patients the nasal polyps had appeared in the third decade or later; not in a single case was CF suspected based on case history.

The polyp tissue was immediately fixed in 10% formaldehyde (Lillie's solution) embeded in paraffin sectioned (4-6μm) and stained with haematoxylin-eosin and PAS. Alle sections were given a code number, so the microscopist's examination was performed blindly.

The histological evaluation of the specimens was based on the following parameters.

1. Type of epithelial cover.
2. Number of goblet cells in respiratory epithelium.
3. Basement membrane.
4. Density of interstitial tissue.
5. Vascularisation.
6. Density of reticular fibrils.
7. Cellinfiltration, with special regard to the eosinophils. In a representative area all eosinophils within one mm^2 were counted. A semiquantitative evaluation (+, ++, +++) of the number of round cells was made.
8. Glandular morphology was observed and a semi-quantitative evaluation of the number of glands was performed.

RESULTS

Among the parameters on which the histological evaluation was based the tissue

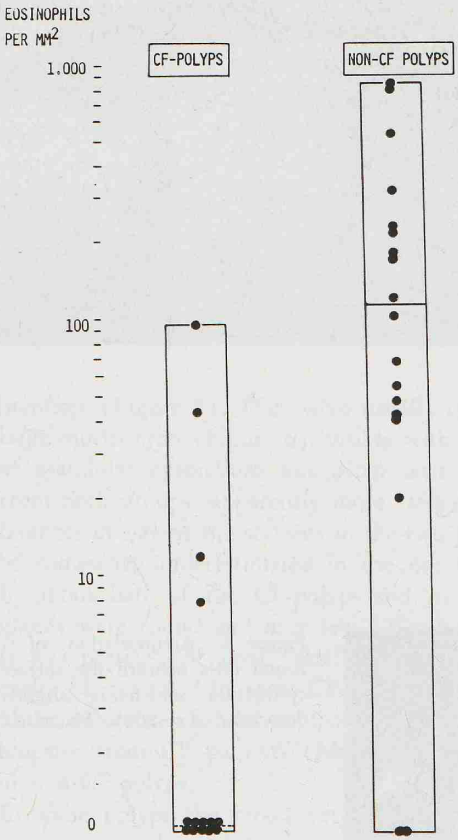

Figure 1. Number of eosinophilic cells per mm^2 in CF-polyps and non-CF polyps.

eosinophilia proved to be the most valuable factor in the differentiation between CF and non CF-polyps.

There was a marked and highly significant difference (Rangsum test $p < 0.001$) in the number of eosinophils in polyps between CF and non-CF patients (Figure 1). Contrary to eosinophils there are significantly more round cells (lymphocytes and plasma cells) in the CF-polyps ($p < 0.01$) (Figure 2). Varying degrees of accumulation of lymphocytes and plasma cells was in particular pronounced beneath the surface epithelium (Figure 3), but also around glands and blood vessels (Figure 4). In both groups neutrophils were few and scattered without perivascular accumulation.

Generally the amount of intercellular fluid seemed to be higher in the non CF tissue, whereas the CF-polyps showed a more dense interstitual tissue, although this difference was not significant. By van Giesson staining no collagen tissue was found in either group. No quantitative difference in the other examined parameters was found, especially the epithelial cover was the same in both groups. The polyp glands were few and generally pathological without or only with few

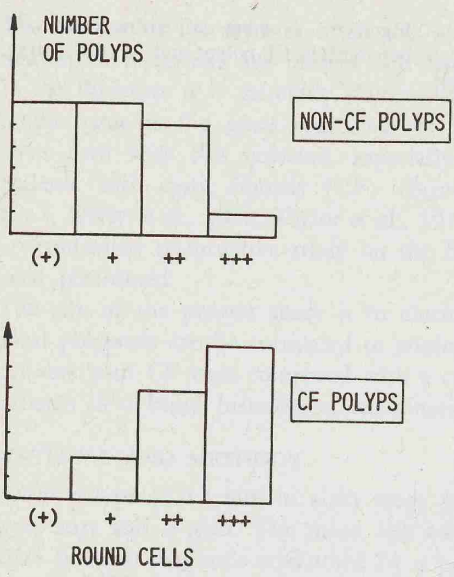

Figure 2. Semiquantitative estimation of round cell infiltration in CF-and non-CF polyps.

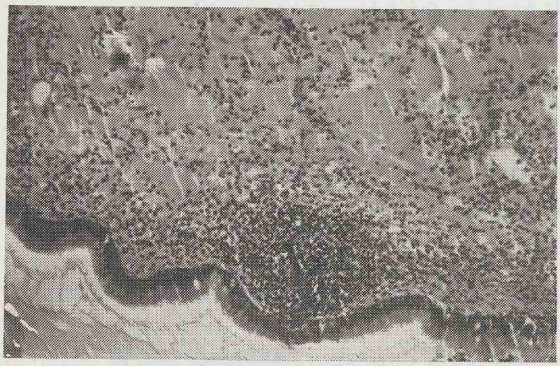

Figure 3. Accumulation of round cells beneath the surface epithelium which is slightly detoriated (x 800). Haem.-eo.

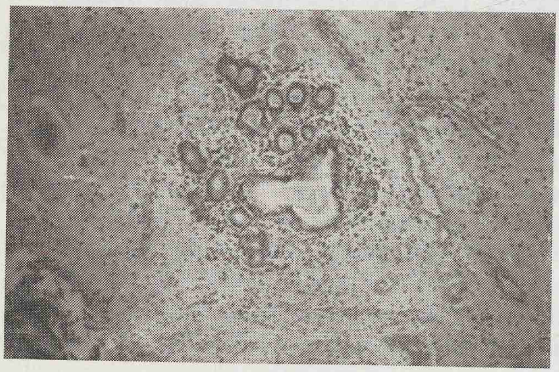

Figure 4. Round cell infiltration around glands in the submucous tissue (x 400) Haem.-eo.

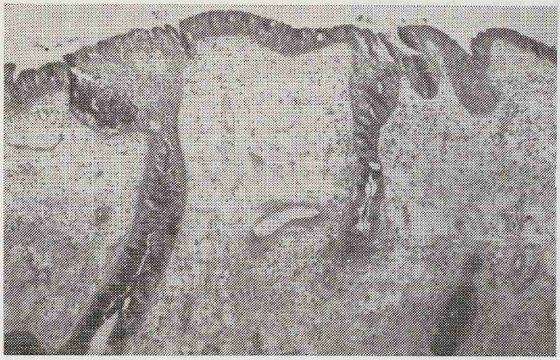

Figure 5. Long tubulous glands in CF polyp, (x 400). Haem-eo.

branches (Figure 5). They were usually cystic dilatated by mucus, often forming large mucus cysts (Figure 6), visible with the naked eye. In addition degeneration of glandular epithelium was often seen. These changes were found in polyps from both groups, apparently more frequently in the CF-polyps. But due to differences in size of the sections in the two groups, the glandular abnormalities may be somewhat underestimated in the non-CF group.

In about half of the CF-polyps and in a single non-CF polyp corkscrew-like glands were found and in a few CF-polyps another gland abnormality was seen. It was presence of smal "satellite" acini in the circumference of a large cystic cavity (Figure 8). In some CF-polyps the glands contained homogenous eosinophilic substance, similar to the eosinophilic plugs found in glands from labial biopsies from CF patients (Morling et al., 1977), however this was also seen in non-CF-polyps.

In some polyps the blood vessels had a linear and elongated appearance, not seen in normal nasal mucosa (Figure 7).

DISCUSSION

In general the tissue eosinophilia, wellknown for the "non-CF" polyps in adults was absent from the CF polyps. Eosinophil cells were only seen in 29% of the

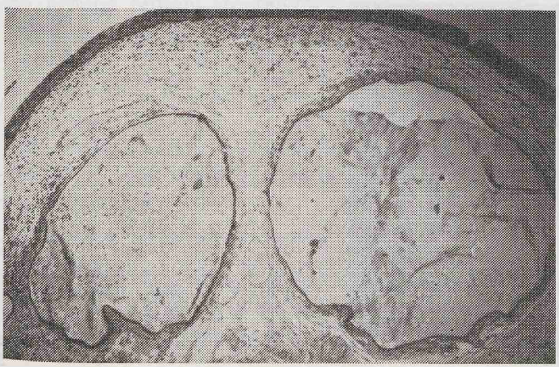

Figure 6. Large distended cystic clands containing eosinophilic "plug" material (x 400). Haem.-eo.

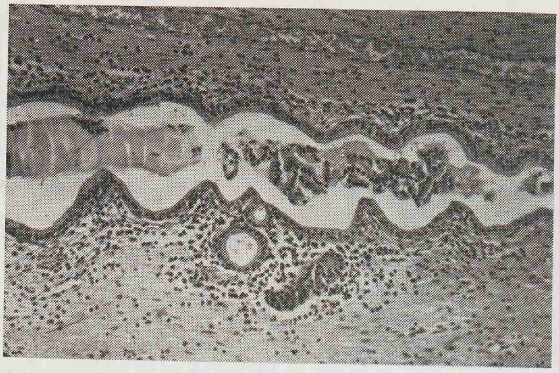

Figure 7. Corkscrew-like gland in CF polyp. Also observe the linear and prolongated appearance of the vessel. (x 400). PAS.

CF polyps against 88% in the other group. Thus, the parameter most suitable for making the distinction between the two polyp groups was tissue eosinophilia, which was absent in almost all CF- polyps. Based on this parameter it was possible in most cases to make a correct statement about the nature of the polyp. The pathology of polyp glands was striking. Mucus retention cysts and degeneration of glandular epithelium was consistent with the pattern found in other organs of CF patients (Wood et al., 1976). It is interesting that cystic dilatation and gland degeneration is also found in the non-CF patients. Nasal polyps are shown to be devoid of nerves to blood vessels and glands (Cauna et al., 1972), a possible explanation of oedema formation and of gland pathology. Among a series of suggested causes of CF, abnormal gland innervation has been mentioned (Wood et al., 1976) a possibility which deserves further consideration.

It has been stated that corkscrew-like glands are characteristic for CF polyps (Taylor et al., 1974 and Oppenheimer and Esterly, 1975) which has been confirmed in the actual study. However, this abnormality was seen only in half of the CF polyps, although plenty of tissue was microscoped. Formation of "satellite acini" apparently characteristic for CF polyps was an inconsistent finding. In whole-mount preparations this characteristic glandular morphology can also be vizualised (Cauna et al., 1972).

A quantitation of the eosinophilic "plugs" in distended glands was not performed.

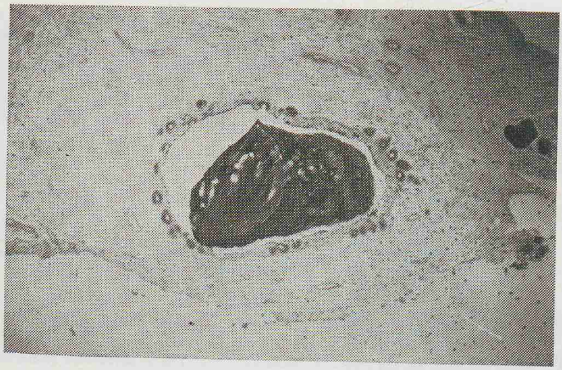

Figure 8. Cystic cavity surrounded by "satelite" acini. (x 400). PAS.

As mentioned the plugs was found also in non CF polyps and the mere presence of a plug cannot be used as a dicisive clue. For practical purpose the eosinophil count seems much more valuable.
For comparison with the CF children we have chosen adult patients with severe steroid-responding polyposis. Although the histological examination was found very suitable for making a distinction between these two groups it does not imply that the diagnosis CF, can be made in this way. There is an intermediate group of patients with nasal polyps of unknown nature and with a histological picture resembling that of both the investigated groups. Some of these patients may belong to the CF group although the sweat test has been negative.
In conclusion, the histological examination of nasal polyps is of importance for the correct classification of the patient and for a better comprehension of the disease, but no conclusive diagnostic evidence with regard to CF can be drawn based on microscopy of nasal polyps.

RÉSUMÉ

L'étude actuelle consiste à rechercher la corrélation existant entre l'étiologie et l'histologie des polypes nasaux en se référant spécialement à la fibrose kystique (FK).
Des polypes nasaux prélevés chez 15 enfants atteints de FK et chez un groupe témoin de 15 malades adultes présentant des polypes non FK, on été examinés à l'aide d'un microscope optique. L'évaluation histologique a été conduite en présence d'un groupe témoin pour éviter tout écart.
Parmi les paramètres utilisés l'eosinophilie tissulaire s'est révélée le facteur le plus valable dans la différenciation entre les polypes FK et non-FK, étant donné que seulement quelques éosinophiles ont été trouvés dans le cas des polypes FK. Les glandes des polypes n'étaient pas plus nombreuses et généralement pathologiques. Quelques anomalies caractéristiques dans la morphologie glandulaire sont apparement plus répandues dans le cas des polypes FK.
On peut conclure que l'examen histologique des polypes nasaux présente de l'importance pour la détermination correcte de la maladie, mais le diagnostic de FK ne peut pas être effectué sur la base d'une microscopie des polypes.
Des études supplémentaires comprenant l'examen histologique avec la présence de groupe témoin de polypes nasaux, pourront contribuer à un diagnostic plus différencié de la polypose nasale.

ZUSAMMENFASSUNG

Die Absicht der vorliegenden Arbeit ist es, die Zusammenhänge zwischen Ätiologie und Histologie nasaler Polypen, in Fällen von cystischer fibrose (CF) zu beleuchten.
Es wurden 15 nasale Polypen von Kindern mit CF, und 15 nasale Polypen einer Kontrollgruppe von Erwachsenen ohne CF, lichtmikroskopisch untersucht.
Unter den angewandten Parametern erwies sich die Gewebs-eosinophilie als sicherstes Kriterium in der Differenzierung zwischen CF-Polypen und Polypen

anderer Genese, zumal nur ganz wenige eosinophile Zellen in CF-Polypen zu finden waren.

Die Drüsen der Polypen waren meistens pathologisch und gering an Zahl. Einige charakteristische, morfologische Drüsenabnormitäten sind häufiger in CF-Polypen anzutreffen.

Es ergiebt sich die Folgerung, dass die histologische Untersuchung nasaler Polypen wesentlich zur korrekten Klassifizierung des Patienten beiträgt, doch kann die Diagnose CF nicht alleine auf Grund des mikroskopischen Befundes gemacht werden.

Weitere Studien nasaler Polypen, unter Einschliessung blinder histologischer Untersuchungen, könnten zur besseren Differential-diagnose nasaler Polypen beitragen.

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