The presence of fungal floras in sinuses in chronic sinusitis patients with polyps

Obecność flory grzybiczej w zatokach przynosowych u pacjentów z przewlekłym zapaleniem zatok z obecnością polipów

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ABSTRACT

Several fungal species are known to cause severe respiratory and cutaneous diseases. The aim of this work was to analyze the fungal flora in maxillary sinuses in patients suffering from chronic sinusitis with polyps. Twenty five patients (11 woman, 14 man) who underwent endoscopic surgical procedures were included into the study. During the operation, the smear from the maxillary sinus were obtained for the incubation. In 6 persons fungal floras was present.

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Introduction

In recent years there is an increase in reports of fungal invasion accompanying sinusitis. It is connected with several promoting factors as diabetes, steroidotherapy, immunosuppression and many others. Moreover, improvements in diagnostic methods allow us to diagnose these infections more frequently. The most often recognized fungal pathogens are Aspergillus fumigates and Aspergillus flavus [1, 2]. Some authors suggest, that frequency of fungal presence in sinuses in healthy human or chronic sinusitis patients range 100%,...
however others claim that it is only 20% or even less [3, 4]. It is possible that this low fungal detection in some cases is related with difficulty in pathogen identification. Moreover in many patients with sinusitis the diagnosis of fungal presence is not performed. It is important to add that only histopathological examination may answer if there is a subepithelial infiltration of the fungi and this examination is crucial in the follow-up [5].

The trigger of chronic sinusitis is the pathology in ostiomeatal complex. The ciliary movement in the direction of the natural ostium, on one hand, transports mucus to nasal cavity, on the other hand prevents pathogens from getting into the sinuses. The pathologies of the complex disturbed ventilation, drainage and protective functions of sinuses lead to inflammatory states [6]. Furthermore, fungal contacts may lead to sinusitis [7]. There are three major ways leading to that infection: allergy, direct fungal invasion or effects of toxic fungal products [7].

Material and methods

Twenty five patients (11 woman, 14 man) aged 34–73-yrs-old (average 55 yrs), suffering from sinusitis with polyps and who underwent surgical approach in ENT Department in Zabrze, were included into the study. The diagnosis was set according to the interview, ENT examination and CT results. Four patients had diagnosed asthma, 5 had allergic rhinosinusitis. All patients were free from immunological disorders, cystic fibrosis or ciliary immobile syndrome. All patients had no symptoms of fungal presence in nasal smear or CT. In all patients, the smear from maxillary sinus was done under sterile conditions during surgery (FESS).

The samples were incubated on plates (Biocorp, Poland) on three kind of basis: Sabouraud dextrose with Chloramfenicol Lab-Agar (26 and 37°C), Czapek-dox Lab-Agar (26 and 37°C) and Candida Chromogenic Lab-Agar (37°C) in the Microbiological Laboratory. All patients qualified for the study underwent routine diagnostic skin tests with inhaled allergens: grass/cereal, grass, weed, rye, trees I, trees II, Candida albicans, Dermatophagoides pteronyssinus, Dermatophagoides farinae, dog’s and cat’s fur, Alternaria alternata, Cladosporium herbarium, mould’s mix I (Botrytis cinerea, Cladosporium herbarium, Culuvularia lunata, Fusarium moniliforme, Helminthosporium), mould’s mix II (Aspergillus fumigatus, Mucor mucedo, Penicillium notatum, Rhisopus nigricans, Serpula lacrymans, Pululuria pullulans). Moreover, the concentrations of specific IgE for Alternaria alternate, Cladosporium herbarium and total IgE were estimated.

Results

In 6 of 25 patients (1 woman, 5 man) fungi were present in plates with chloramfenicol (Tab. I):

1. 71-yrs-old female after 4 FESS, with asthma, tlgE – 89, s IgE – 0, skin tests – 0
2. 73-yrs-old male after 8 FESS, with Samter’s triad, tlgE – 35.4, sIgE – 0, skin tests – 0
3. 35-yrs-old male after 12 FESS, with Samter’s triad, tlgE – 110, sIgE – 0, skin tests – positive for grass and house dust
4. 61-yrs-old male after 2 FESS, tlgE – 90, sIgE – 0, skin tests – 0
5. 40-yrs-old male after 4 FESS, tlgE – 93, sIgE – 0, skin tests – weed and house dust
6. 73-yrs-old male after 2 FESS, tlgE – 48, sIgE – 0, skin tests – 0

All these fungi positive patients were free from fungal allergy. Concentrations of tlgE were normal. Those patients underwent average 5 times FESS. In 19 remaining patients, free from fungal species, average 2 (from 1 to 3) FESS were described, no fungal allergy were reported and concentrations of IgE were normal.

Discussion

Acute or chronic sinusitis have been reported in average 20% of the population [3, 8]. Until nowadays, there is a controversy concerning the classification of sinus and nose infections, especially in the matter of fungal infections. Fungi are widespread all around the Earth. They are one of the most spread inhaled allergens. The strongly allergized parts of fungi are their spores, but also spasm, that includes most of their species typical allergens.

Chronic fungal sinusitis are divided into invasive and non-invasive type. One of non-invasive types is saprophytic infection of the paranasal sinuses. It is an asymptomatic sinus infection, often present in patients after a few sinus surgeries suffering from chronic infections [8]. This type may progress into a fungal ball. Also the allergy may occur in the situation of permanent fungal presence [9]. In 6 patients who had undergone the surgery in our Department, fungi were incubated in the samples. No symptoms of fungal infection were found in those patients during the pre-surgery interview, ENT examination or in CT scans. Detection of fungi in the surgery samples was crucial in the postoperative treatment and the follow-up [8–11]. In comparison to patients who had no fungi in the postoperative material, those fungi positive patients had to undergo the surgery at least twice more.

Table I – Patients with positive fungi cultures

<table>
<thead>
<tr>
<th>tlgE kU/l</th>
<th>sIgE kU/l</th>
<th>skin tests</th>
<th>FESS count</th>
<th>others</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.T. 71 yrs</td>
<td>89</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>G.Z. 73 yrs</td>
<td>35,4</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>B.P. 35 yrs</td>
<td>110</td>
<td>0</td>
<td>grass, house dust</td>
<td>12</td>
</tr>
<tr>
<td>C.M. 62 yrs</td>
<td>90</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Z.P. 40 yrs</td>
<td>93</td>
<td>0</td>
<td>weed, house dust</td>
<td>4</td>
</tr>
<tr>
<td>P.M. 73 yrs</td>
<td>48</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
We suppose that it may be because of the fungal presence. The proper treatment in those cases is to clean the nasal cavity and sinuses from the secretion and rinse using the physiologic saline. Treatment with anti-fungal drugs is not necessary. Non-invasive fungal infection is a reversible state, that is why it has to be remembered to make periodic ENT control [4]. Telmesani et al. [12] and Ferguson [13] report that allergic fungal rhinitis with polyps is the cause of exacerbation of the illness and most frequently needs surgery. Total IgE concentration in those patients was always high and correlated with aggravation of the illness [12, 13]. In our patients we did not confirm allergic fungal sinusitis and there was no elevation of total IgE concentration, although in some of them fungi were present in the samples. Those patients required more frequent surgeries. Of course it is hard to clearly confirm, that presence of fungi was strict cause of the aggravation of the sinusitis, but it could have some influence on the course of the process.

Authors’ contributions/Wkład autorów

According to order.

Conflict of interest/Konflikt interesu

None declared.

References/Piśmiennictwo