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ORIGINAL ARTICLE

Microbiology of the Maxillary and Ethmoid Sinuses in Patients with Chronic Rhinosinusitis Submitted to Functional Endoscopic Sinus Surgery

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Summary

Chronic rhinosinusitis microbiology studies show the presence of aerobe and anaerobe microorganisms, fungus and virus and their incidence vary according to each study. These studies guide us on choosing the most adequate antimicrobial agent to eliminate the infectious process, thus, helping in restoring rhinosinusal mucosa. **Study design:** Clinical prospective. **Aim:** This work aimed at studying the microbiology of the maxillary and/or ethmoid sinuses of patients with chronic rhinosinusitis and with indication of functional endoscopic sinus surgery. **Materials and methods:** During surgery, we collected secretion and/or fragments of maxillary and/or ethmoid sinus mucosa from 41 patients to perform Gram stain, fungus direct research, aerobe and anaerobe microorganism culture and fungus culture. **Results:** We identified the presence of aerobe microorganisms in 21 patients (51.2%), anaerobe microorganisms in 16 (39%) and fungus in 1 (2.4%). In the studied population, only 12 patients (29.2%) presented microorganisms considered pathogenic when analyzed together with the semi-quantitative leukocyte count. Staphylococcus coagulase-negative and Staphylococcus aureus were the most frequent microorganisms found, in 5 (12.18%) and in 4 (9.75%) patients respectively. **Conclusion:** This study reveals that Staphylococcus coagulase-negative and Staphylococcus aureus were the most frequent microorganisms isolated from patients with chronic rhinosinusitis.

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INTRODUCTION

Chronic rhinosinusitis (CRS) is defined as an inflammation of the nasal cavities mucosa and the paranasal sinuses for more than 12 weeks. The prevalence of chronic rhinosinusitis in the United States is estimated as present in 14% of the general population[1]. There is no epidemiological study in Brazil, but it is most likely similar to the American[2] one. The sinus permeability might be involved due to anatomic alterations in the nasal cavity[3], alterations in viscosity, volume and composition of nasal mucus and to alterations in the mucociliary transportation. These alterations might lead to mucus stasis, lower the local oxygen concentration with subsequent infection. The drainage ostium blockage is the main factor for the non-resolution of sinusitis in most patients[4,5].

The microbiological studies of CRS show the presence of aerobic and anaerobic microorganisms, fungi and viruses, varying the incidence according to each study. The microbiology studies of CRS guide towards choosing the most adequate antimicrobial to eliminate the infectious process, helping reestablish rhinosinusal mucosa homeostasis. The results of these studies vary according to the population studied, the mean of transportation used, time elapsed for processing the sample in the laboratory and the culture technique used[6]. We made this study in order to investigate the microbiology of the maxillary and/or ethmoid sinus of patients with CRS and with indication of functional endoscopic sinus surgery (FESS). During surgery we collected secretion and/or fragments of maxillary and/or ethmoid sinus mucosa.

MATERIALS AND METHODS

This study was approved by the Ethics Committee of the University Hospital of the São Paulo University Medical School (HCFMUSP) and in all cases we obtained a signed consent either from the patient or the patient's legal guardian.

We made a prospective study in 41 patients, 22 males and 19 females, with ages ranging from 13 to 75 years, diagnosed with CRS, seen at the otolaryngology outpatient ward at the HCFMUSP between June 2001 and December 2002. The sample calculated by the epidemiologist was of 41 patients with CRS after having gathered data on the incidence of microorganisms from the literature. All patients were above 13 years of age, with two major factors (nasal obstruction, nasal secretion, migraine, pain or sinus pressure and olfactory disturbance) or one major and two minor factors (fever, halitosis, cough and irritability) for longer than three months and with no improvement after clinical treatment with antibiotics (21 days), systemic steroids (10 days), nasal drops or decongesting agent when necessary, and nasal flush with 0.9% saline solution. Besides this, CT scan showed, in all patients, a blurring of one or more paranasal sinuses and of the meatal ostium complex. No patient had been using any antimicrobial agent 30 days prior to material collection. Patients with immunodeficiency, Killian polyp or malignant tumor of the nasal cavities were excluded. The same examiner selected the patients and collected the samples during surgery.

The 4 mm Karl Storz rigid endoscopes with 0° and 30° angle were immersed in glutaraldehyde for 30 min and then washed with sterile water, prior to surgery. Asepsis of the face and nasal vestibule were done with topical povidine. After placing surgical dressings, cotton patties embedded in xylocaine solution with adrenalin 1:2000 were placed for 10 min inside the nasal cavities for mucosa vasoconstriction. The endoscopic surgery was performed according to the Messerklinger technique. After opening the maxillary and/or ethmoid sinus, the cavity was seen and all secretion present was suctioned through a catheter connected to a syringe. The removal of a mucosal fragment was done through a Takahashi forceps, with care not to contaminate the sample with the nasal cavity mucosa.

The material collected was immediately prepared for proper transportation by the following: a sample of fragment was placed in thyoglicolate medium, to search for aerobic microorganisms; a sample of fragment was placed in Sabouraud medium to search for fungi; a sample of the fragment was placed in saline solution for direct study of fungi. A dish was prepared for bacterioscopy by the Gram method, and the secretion was placed in a sterile dry tube. The material was taken, in less than 30, to the microbiology laboratory for processing. Material was also sent for anatomopathological exam and was analyzed for the presence of fungi and Charcot-Leyden crystals.

RESULTS

Among the 41 patients studied, 14 (34.1%) showed no growth of microorganisms, 12 (29.2%) showed the presence of only one microorganism, 11 (26.8%) showed the presence of two microorganisms and 4 (9.7%) showed three or more microorganisms. In 21 patients (51%) there was aerobic microorganisms growth, and in 16 (39%), anaerobic growth. In 1 patient (2.4%) there was fungus.

Coagulase-negative Staphylococcus was the most frequently found microorganism - in 5 patients (12.1%), whereas in 2 patients we found: Staphylococcus epidermidis. Staphylococcus aureus was found in four patients (9.75%). Enterobacter aerogenes, Haemophilus influenzae, Peptostreptococcus magnus, Peptostreptococcus sp. e Propionibacterium acnes were found in three patients (7.3%) each. In our case base only two patients had already undergone FESS, one of them showing growth of Staphylococcus aureus and coagulase-negative Staphylococcus; whereas the other showed Enterobacter aerogenes in the cultures. Table 1 depicts the microorganisms isolated and the total number of microorganisms, compared to the total