The Microbial Landscape in Patients with Cystic Lesion of Paranasal Sinuses

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ABSTRACT

The problem of timely diagnosis of chronic cystic sinusitis and the choice of the necessary treatment remains relevant in modern Otorhinolaryngology. Timely diagnosis and treatment of cystic processes of the paranasal sinuses of the nose is one of the priorities of Otorhinolaryngology due to the increased incidence of this pathology. The main factor in the pathogenesis of the development of sinusitis is characteristic not only of the anatomical features of the structure of the nasal cavity, but also of the bacterial factor, which is sometimes represented by various types of microorganisms. The purpose of the study was to study the microbial landscape spectrum of sinuses in patients with chronic sinusitis. The study involved 157 people diagnosed with chronic cystic sinusitis who performed a microbiological examination of the operating material from the sinus. Microflora growth was found in 32 (92.5%), of which 3 cases (3.75%) were yeast - like fungi of the genus Candida, with only 3 (8.5%) patients being dominated by sterile crops, aerobic microorganisms from anaerobics. The result of our studies shows the degree of changes in the normal microbial landscape of the sinuses, and it is recommended to determine the value of the degree of dysbiosis of the paranasal sinuses in order to assess the severity of the pathological process.

Keywords: chronic cystic sinusitis, microbial landscape, dysbiosis, sinuses

The relevance of research One of the pressing problems of modern rhinosurgery is timely diagnosis and selection of adequate treatment for paranasal sinus cysts. In modern medicine, a large number of otolaryngological diseases are known that are associated with the development of inflammatory processes in the nasal cavity. Sinusitis occupies one of the leading places in the structure of pathologies of all ENT organs [2,4,11]. Among all the sinuses, the maxillary sinuses are most susceptible to the inflammatory process, which are characterized by high prevalence and a tendency to a chronic relapsing course. In the practice of an otorhinolaryngologist, chronic cystic maxillary sinusitis is very common, occupying one of the leading places on the list of chronic pathologies of the ear, nose and throat organs [1,5]. Of all the paranasal sinuses of the nose, in 93% of cases the maxillary (maxillary) sinus is susceptible to cystic lesions. Cysts of the maxillary sinuses, being a common pathology in all age groups, sometimes represent clinical findings during radiography and computed tomography of the paranasal sinuses [5,7]. Timely diagnosis and treatment of cystic processes in the paranasal sinuses is one of the priorities of otorhinolaryngology, due to the increasing incidence of this pathology.

The main factor in the pathogenesis of the development of sinusitis is given particular importance not only to the anatomical features of the structure of the nasal cavity, but also to the bacterial factor. Microflora, as the cause of

sinusitis, is sometimes represented by different types of microorganisms, which requires the need to regularly study its species composition. At this timeThe problem of microbial resistance to antibiotics is widespread throughout the world [3,7,13]. The widespread use of antibiotics in the fight against bacterial infections has led to the selection and pronounced dissemination of antibiotic-resistant strains of microorganisms, as well as the emergence of various evolutionarily determined adaptive factors, manifested in various mechanisms of transfer of resistance genes between bacteria under certain environmental conditions [1,3].

The main goal of drug therapy is eradication of the pathogen and restoration of the biocenosis of the paranasal sinuses [1,6,12]. But difficulties arise in obtaining reliable data on the nature of the true pathogens of cystic sinusitis and their antibiotic sensitivity, in most cases, due to the lack of necessary equipment in hospitals and clinics [5,13]. Even with modern equipment of the bacteriological service of medical institutions, accurate identification of the pathogen is possible only 5–7 days after sending the material for research [4,9]. Therefore, the prescription of antibacterial drugs at outpatient appointments and in the initial period of patients' stay in specialized departments is often carried out empirically [3,4]. Thus, the appearance of dysbiotic disorders of autoflora is closely associated with the formation of endogenous sources of potential pathogens, which once again emphasizes the importance of carrying out preventive measures aimed at eliminating them or preventing their formation [6,7]. Unfortunately, traditional treatment regimens, used by doctors for decades, do not always meet modern requirements of clinical microbiology, do not take into account data on the natural sensitivity of microorganisms to antibiotics, and do not prevent or stop the development of dysbiosis in patients. The consequence of this is the formation of protracted chronic forms of sinusitis, a recurrent course of the disease, the treatment of which is extremely difficult.

Based on the above, the purpose of the study was to study the spectrummicrobial landscape in patientswith cystic lesions of the paranasal sinuses.

Materials and methods of research. In the clinic of the Samarkand Regional Multidisciplinary Medical Center from 2021 to 2024157 people were examined, including 91 men and 66 women diagnosed with paranasal sinus cysts aged 18-70 years. The diagnosis was confirmed by X-ray studies (CT, MSCT). All of them had signs of cystic sinus lesions, but had not previously been to an outpatient appointment with an otolaryngologist. In 90.5% of cases (142 patients), cystic lesions of the maxillary sinus, both unilateral and bilateral, were detected. In second place, lesions were detected in the sphenoidal sinus (13 patients) and in third place in the frontal sinuses (2 patients).

In all patients, except for the general clinical one, a microbiological study of surgical material from the sinus was performed. Patients are advised to stop taking antibiotics 24 hours before surgery. The subject of the microbiological study was the material of the mucous membrane of the operated sinus. Material for microbiological examination was collected from the walls of the sinus using sterile turundas of standard inoculation tubes. To obtain information about the quantitative content of microorganisms in the selected material, the inoculation method was used. For the isolation of anaerobes, use blood agar; for aerobes, Endo and Chistovich medium. Cultivation was carried out in a thermostat at 37 C under aerobic and anaerobic conditions with colony counting. Identification of isolated cultures was carried out using a bacteriological analyzer[3]. For the cultivation of staphylococci, yolk-salt agar was used, followed by the study of cultural, morphological properties, lecithinase and plasmacoagulase activity. Antibiotic resistance of S.aureus was determined using a Vitek 2 Compact microbiological analyzer (Biomerieux). Sensitivity to antibiotics of some of the studied cultures was carried out using the disc diffusion method using discs from Himedia (India). The results were taken into account by measuring the diameter (taking into account the diameter of the disc) of growth retardation. To interpret the results obtained, tables were used

by comparing the diameter of the growth inhibition zones of the studied crop with the boundary values of the zone diameter in the table. Microbiological monitoring of antibiotic resistance was carried out using the analytical computer program WHONET (USA), recommended by WHO. Statistical processing of the obtained digital data was carried out using the programs Statistica 6.0, Excel 2007. The value of $p<0.05$ was taken as the level of statistical significance.

Research results. During a bacteriological examination of 157 patients diagnosed with chronic cysticsinusitismicroflora growth was detected in 143 (91%), of which in 3 cases (4.75%) - yeast-like fungi of the genus Candida, sterile cultures only in 3 (4.75%) patients. The most common pathogens were: Peptococcus (22.5%), Bacteroides (13.75%), Peptostreptococcus (11.25%). Anaerobes were sown 12.5% more than aerobes. Aerobic microorganisms predominated over anaerobic ones in patients with chronic cystic sinusitis by 25%; gram-positive cocci of the genus Staphylococcus were found in 4.6% of cases. (Table 1)

Table 1 The frequency of occurrence of microflora of the sinus in patients.

Microflora of the sinus	Microorganism detection frequency abs. %		Antibiotic sensitivity
ANAEROBES			
Bacteroides	17	10.82	cefopyrazone, cefipim, gentamicin
Peptococcus	13	8.28	cefopyrazone, cefipim, amikacin, oxacillin
Peptostreptococcus	13	8.28	cefopyrazone, cefipim, tetracycline
Str. parvulus	eleven	7	cefopyrazone, cefipim, oxacillin, cefazolin
Str. morbillorum	9	5.73	amikacin, gentamicin, cefazolin
B. fragilis	7	7	lincomycin, ciprofloxacin
AEROBES			
a-hemolytic streptococcus	21	14.2	levofloxacin, cephalexin, oxacillin, ampicillin
S. epidermis	13	8.57	cefotaxime, tetracycline, lincomycin
acinetobacter	17	11.4	gentamicin, ciprofloxacin
Ps. aeruginosa	eleven	7	amikacin, ciprofloxacin
S. aureus	eleven	7	amoxicillin, doxycycline, levofloxacin, gentamicin, ciprofloxacin, oxacillin
H. influenzae	eleven	7	amoxicillin
No growth	3	1.91	
Total	157	100	

Thus, the most common anaerobes were Bacteroides (11.4%), Peptococcus (8.57%), Peptostreptococcus (8.57%), and among aerobes, hemolytic streptococcus (14.2%), S. Epidermis (8. 57%), Acinetobacter (11.4%).

Aerobic microorganisms predominated over anaerobic ones in patients with chronic cysticmaxillary sinusitisby 57.1%. Pure cultures were obtained from 88.2% of those examined, associations - from 11.8%. Among mixed cultures, associations of two microorganisms were found in the sinus contents in 81.8%, three in 13.6%, and four in 4.6%. All patients received antibacterial therapy taking into account the sensitivity of microorganisms. Sensitivity to gentamicin was found in 65.6% of streptococci, 32.75% of Enterobacteriaceae family bacilli, and 57.7% of S.aureus, which predominated among the isolated staphylococci. 48.8% of streptococci were sensitive to macrolides, and 32.7% of Enterobacteriaceae bacilli were sensitive to cefaperazone. P.aeruginosa was sensitive to fluoroquinolones in 64.5% of cases. Bacteria of the genus Proteus were sensitive to aminoglycosides in 57.8%. S.aureus was sensitive to tetracycline in 50% and doxacycline in 61%. 65% of staphylococci, 84% of streptococci are sensitive to gentamicin, and the least sensitive to it were bacilli of the Enterobacteriaceae family - only 9%. Half of the studied microorganisms were sensitive to erythromycin: 57% of streptococci, 41% of staphylococci and 52% of Enterobacteriaceae family bacilli. Streptococci and staphylococci were highly sensitive to third-generation cephalosporins and fluoroquinolones, and staphylococci to vancomycin. The most active antibacterial drug against gram-negative bacilli of the Enterobacteria family was amikacin. Cephalosporins of the first and second generations, gentamicin, and tetracyclines decreased their activity on the studied microorganisms.

When analyzing the frequency of isolation of S. aureus from biological material of patients, it was found that the specific gravity of isolation of this pathogen from the blood was relatively small and amounted to 1.8% of all isolated strains. However, it should be noted that staphylococcal sepsis can be a consequence of diseases caused by S.aureus, of any localization and is characterized by a severe course and high mortality. Therefore, continuous microbiological monitoring of this pathogen is necessary, especially for invasive infections, in hospitals of various profiles. We can also state that pathogenic microorganisms are more often sown. This is due to the resistance of a number of microorganisms to certain antibiotics and, consequently, the irrational choice of antibiotic therapy during treatment in some cases. That is, where patients took pro- and prebiotics in parallel with antibiotic therapy, more often the culture turned out to be sterile; neither pathogenic microflora nor opportunistic microflora, which should be present normally, were found. We associate this with the possible development of dysbiosis in patients.

conclusionsInitial microbiological studies of sinus secretions in patients with cystic lesions revealed a predominance of anaerobic flora (57.1%) over aerobic flora (42.9%). The severity of the clinical course of the disease in most cases depended on the presence of associations of microorganisms and was characterized by unsuccessful use of antibacterial drugs of various groups. In cystic sinus lesions, the result of our study provides evidence of a relationship between the levels of change in the normal microbial landscape of the maxillary sinuses. Determining the level of dysbiosis of the maxillary sinuses, as a test control, is recommended to assess the nature of the pathological process.

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