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EXUDATIVE OTITIS MEDIUM IN BENIGN NEOPROUNDS OF THE NOSE, PARANASAL SINUSES AND NASOPHARYNX

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Annotation: Data are presented on the features of exudative otitis media in benign neoplasms of the nose, paranasal sinuses and nasopharynx. The otomicroscopic picture of the disease is considered. A detailed audiological assessment was given and the immunological parameters of patients with exudative otitis media with benign neoplasms of the nose, paranasal sinuses and nasopharynx were studied. Modern methods for diagnosing exudative otitis media are characterized.

Key words: exudative otitis media, benign neoplasms of the nose, paranasal sinuses and nasopharynx, otomicroscopy, audiological indicators, immunity.

Introduction.

The World Health Organization (WHO) projects that by 2030 the number of people with hearing loss will increase by more than 30%. Also, a third of all cases of hearing loss are associated with diseases of the middle ear. In recent decades, the number of cases of exudative otitis media (EOM) has increased, which accounts for 15-17% of all cases of ear diseases. EOM is characterized by a protracted course, resistance to traditional methods of treatment and a tendency to relapse after treatment [1,2,3].

In Uzbekistan, the problem of exudative otitis media is the focus of attention of researchers; sensitivity indicators of tympanometry [6], methods of complex diagnostics and surgical treatment [4] are highlighted, and the effectiveness of diagnostic, treatment and rehabilitation measures for hearing pathology is studied [5].

To date, the diagnosis and treatment of EOM for neoplasms of the nose, paranasal sinuses and nasopharynx have been little studied. The relationship between diseases, in particular between inflammatory processes in the auditory tube and tumor processes, and their comorbidity are not taken into account. This, to some extent, explains the high frequency of medical errors [7].

The purpose of the study was to improve methods for diagnosing exudative otitis media in patients with benign neoplasms of the nose, paranasal sinuses and nasopharynx.

Material and research methods. The basis of the research work was the results of examination and complex treatment of 103 patients with exudative otitis media who applied to the otorhinolaryngology department of the 1st clinic of the Samarkand State Medical Institute in the period from 2018 to 2021, as well as 20 practically healthy people. In our work, we used the following criteria for selecting patients: clinical symptoms - complaints of hearing impairment, tinnitus, a feeling of “stuffiness” in the ear, sensations of “fluid transfusion” in the ear; otoscopic data: cloudy, altered eardrum - retraction or bulging is noted, the presence of a fluid level and the presence of air bubbles in the tympanic cavity; hearing loss as determined by threshold pure-tone audiometry; pathological types of tympanograms (type B).

Three groups were identified: 55 patients with exudative otitis media (EOM) with benign neoplasms of the nose (BNN), paranasal sinuses (PS) and nasopharynx (NP) made up main group I, 48 patients with exudative otitis media with chronic rhinosinusitis (CRS) - II the comparison group, as well as 20 practically healthy individuals, formed the control group.

27 patients of group IA after surgical treatment were prescribed traditional treatment for exudative otitis media. 28 patients of group IB (group with complex therapy) used the immunomodulator "Gepon" and the nasal spray "Sinulor" along with traditional treatment.

All patients of the above groups underwent otorhinolaryngological, audiological examination and laboratory research methods. The otorhinolaryngological examination consisted of a detailed collection of complaints and medical history, a classic examination of ENT organs, otomicroscopy, examination of the function of the auditory tubes, and tuning fork tests. To examine the smallest features and details of the anatomical structure of the eardrum, both normally and in pathology, in our work we used an ENT combine from Suntem (China), as well as rigid endoscopes with a diameter of 4.0 and 2.7 mm with an inspection angle of 0° (Delon, Germany). An LED 300 computer system (Delon, Germany) was used to archive photo and video data.

The audiological examination included pure tone threshold audiometry with detailed analysis of air and bone conduction, air-bone gap and tympanometry. Laboratory methods included: bacteriological examination of the smear, the content of the main classes of immunoglobulins in the blood serum using the Mancini radial immunodiffusion method, as well as the subpopulation composition of peripheral blood lymphocytes. In particular, the relative and absolute numbers of the following cell types were determined by immunofluorescence: CD3+ (T-lymphocytes); CD4+ (T helper cells); CD8+ (killer suppressor T cells); CD19+ (B-lymphocytes), the cellular composition of the middle ear exudate was assessed and the NBT (nitroblue tetrazolium) test was performed.

Statistical processing of the results obtained was carried out using modern statistical software R studio version 3.6.2 for the Windows 10 operating system with a confidence level of $p<0.05$.

Research results and discussion. An analysis of the distribution of patients by age category showed that in group I (EOM for BNN, PS and NP), the largest number of patients were encountered in adolescence up to 17 years of age (34.5%), as well as in young people aged 18-44 years (34.5%). whereas in II (EOM for CRS), young patients prevailed - 52.1% and middle-aged 45-59 years old - 25%.

In the main group there was a significant predominance of male patients - 71%; in the comparison group there was also a slight predominance of male patients - 58%.

When analyzing patients of group I according to the histological structure of the neoplasm (Figure 1), the largest number of patients were identified with angiofibroma 53% and papillomas 20%, followed by fibroma 13%, hemangioma 9% and bleeding polyp 5%.

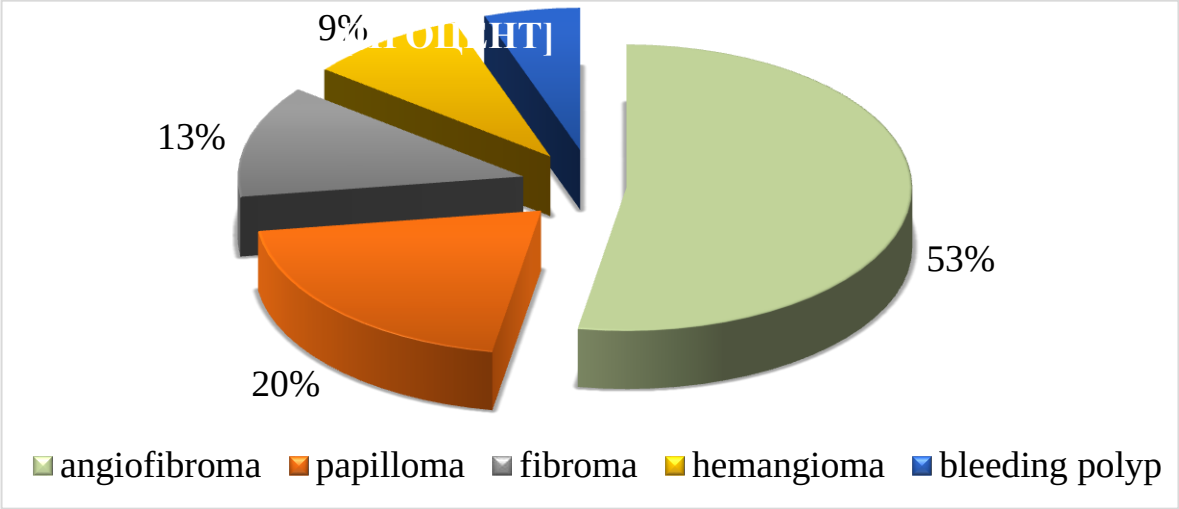

Figure 1. Incidence of benign neoplasms.

The duration of the disease is presented in Figure 2. A study of the disease history showed that patients with BNN, PS and NP sought medical help in later stages of the disease from 6 months and above (87.3%), while the majority of patients with CRS sought medical help before six months (60.4%).

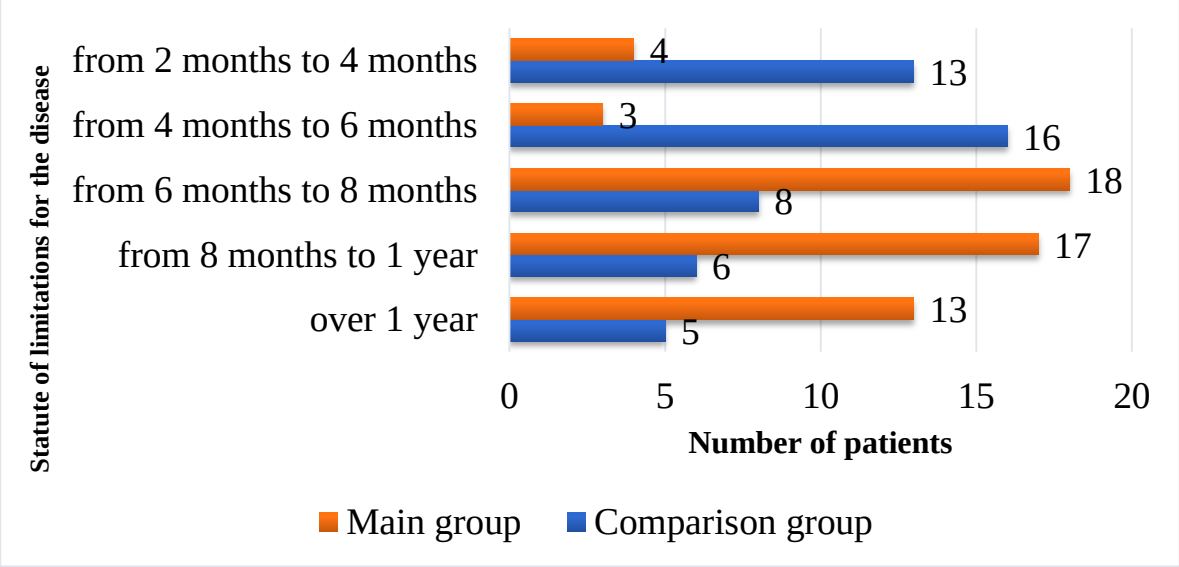

Figure 2. Distribution of patients according to the duration of the disease.

The study of anamnestic data showed that in the main group 41 (74.5%) patients complained of a unilateral process, while in the comparison group both unilateral 26 (54.2%) and bilateral 22 (45.8%) were noted equally processes. The study revealed the following clinical symptoms (Table 1):

Table 1.

Clinical symptoms of exudative otitis media with BNN, PS and NP and CRS

Symptoms	EOM for BNN, PS and NP absolute number (n=55)	EOM for BNN, PS and NP %	EOM for CRS (n=48) absolute number	EOM for CRS %
nasal symptoms				
difficulty breathing through the nose	54	98,1	46	95,8
foreign body sensation	51	92,7	7	14,6
closed twang	33	60,0	28	58,3
nasal discharge	31	56,4	45	93,7
nosebleeds	21	38,1	2	4,2
decreased sense of smell	19	34,5	12	25,0
otological symptoms				
congestion in the ear	28	50,9	23	47,9
hearing impairment	25	45,4	18	37,5
noise in the ear	23	41,8	15	31,2
sensation of fluid in the ear	11	20,0	16	33,3
autophony	10	18,1	12	25,0

The table shows that the complaints of patients in both groups are similar. The largest number of patients in both groups complained of difficulty in nasal breathing in the main group - 54 patients, which was 98.1%, in the control group - 46 (95.8%). In the main group, the second most common symptom was the sensation of a foreign body (92.7%), while in the comparison group the second most common symptom was nasal discharge of a purulent and mucous nature (93.7%). Frequent nosebleeds were also noted in the main group (38.1%). Otological symptoms in patients of the main group were detected more often: congestion in the ear 50.9%, respectively, in the comparison group 47.9%, hearing impairment 45.4% and 37.5%, respectively, noise in the ear 41.8% and 31. 2%, but the symptom of sensation of fluid transfusion in the ear in the comparative group occurred more often 33.3%, compared to the main group 20.0%, autophony in the main group was 18.1%, and in the comparison group the figures were higher than 25%.

In our study, we drew attention to the otomicroscopic picture of patients with EOM with BNN, PS and NP: against the background of a cloudy, altered tympanic membrane, a swollen vascular network is noted in an arrangement similar to the spokes of a bicycle wheel, this network covers 50% or more in area the lower part of the membrane is a sign of a “spoked wheel” (Figure 3).

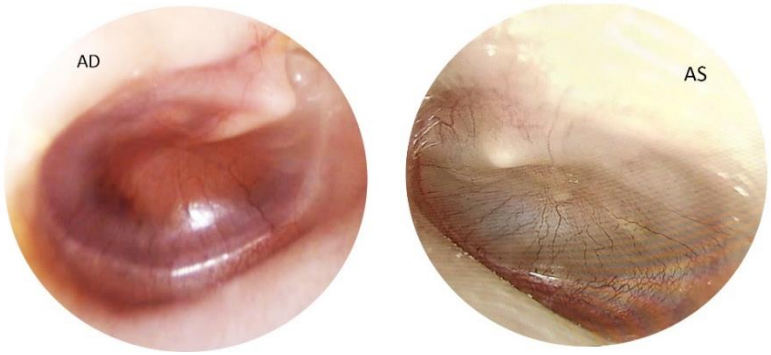

Figure 3. The “spoke wheel” sign is an otomicroscopic picture of exudative otitis media with benign neoplasms of the nose, paranasal sinuses and nasopharynx.

When analyzing the otomicroscopic picture, each ear was assessed separately: in the main group of 69 ears, the "spoke wheel" sign was found in 64 cases, which amounted to a sensitivity of 92.7% (64/69), and in the control group without the disease, consisting of 40 ears in 38 cases the studied sign was not identified, that is, the specificity of the sign was 95% (38/40), then the diagnostic value was determined, which was 93.6% (102/109). In the comparison group of 70 ears, the "spoke wheel" sign was noted only in 16 cases, which amounted to 22.8% (16/70) of sensitivity, the diagnostic value was estimated at 49% (54/110).

The results of assessing the degree of patency of the auditory tube in patients with benign neoplasms of the nose, paranasal sinuses and nasopharynx and with chronic rhinosinusitis are presented in Figure 4.

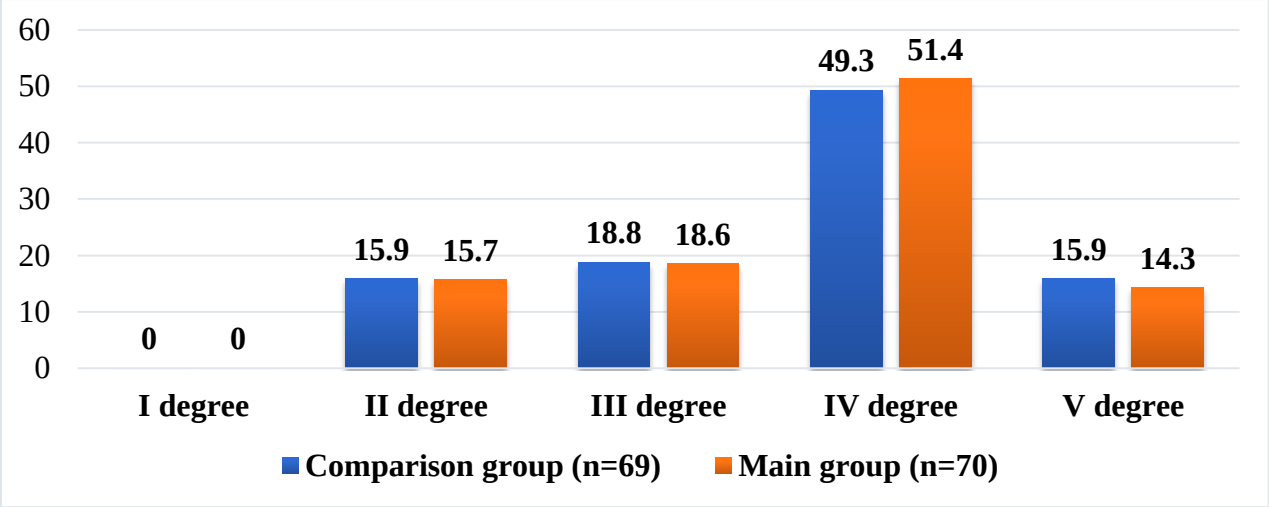

Figure 4. Distribution of patients with EOM according to the degree of patency of the auditory tube before treatment (each ear was assessed separately)

In patients with BNN, PS and NP, degree II patency of the auditory tube was observed in 15.9% of cases, degree III - in 18.8%, degree IV - in 49.3%, degree V - in 15.9%. During EOM in CRS, grade II patency of the auditory tube was recorded in 15.7% of patients, grade III - in 18.6%, grade IV - in 51.4%, grade V - in 14.3%. There was no significant difference between the detection rates of various degrees of patency of the auditory tube in patients with benign neoplasms and chronic rhinosinusitis before treatment.

According to the generally accepted classification of hearing loss, during the initial examination, patients had conductive and mixed forms of hearing loss (Figures 5,6).

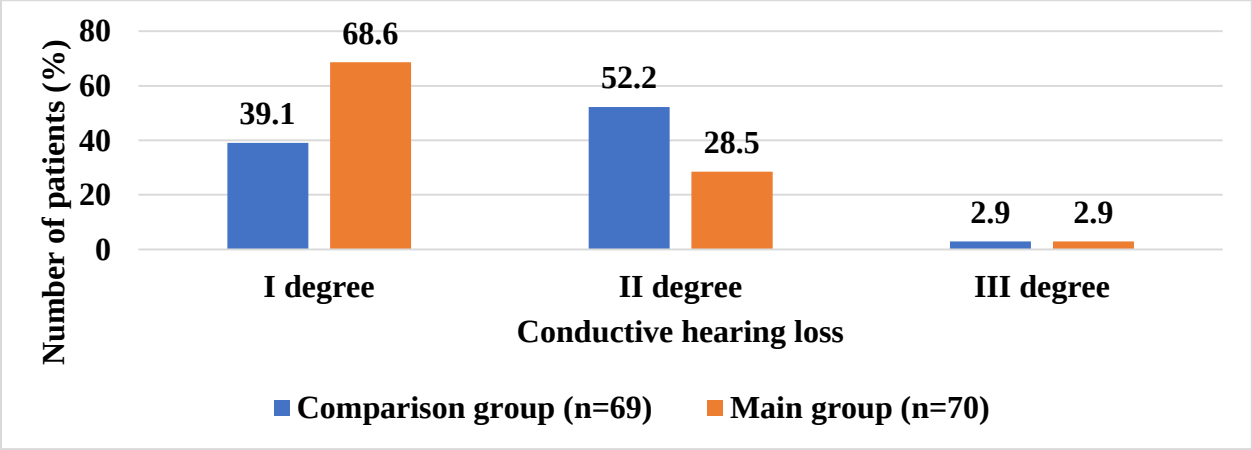

Figure 5. Pre-treatment audiological scores (conductive hearing loss) (each ear assessed separately).

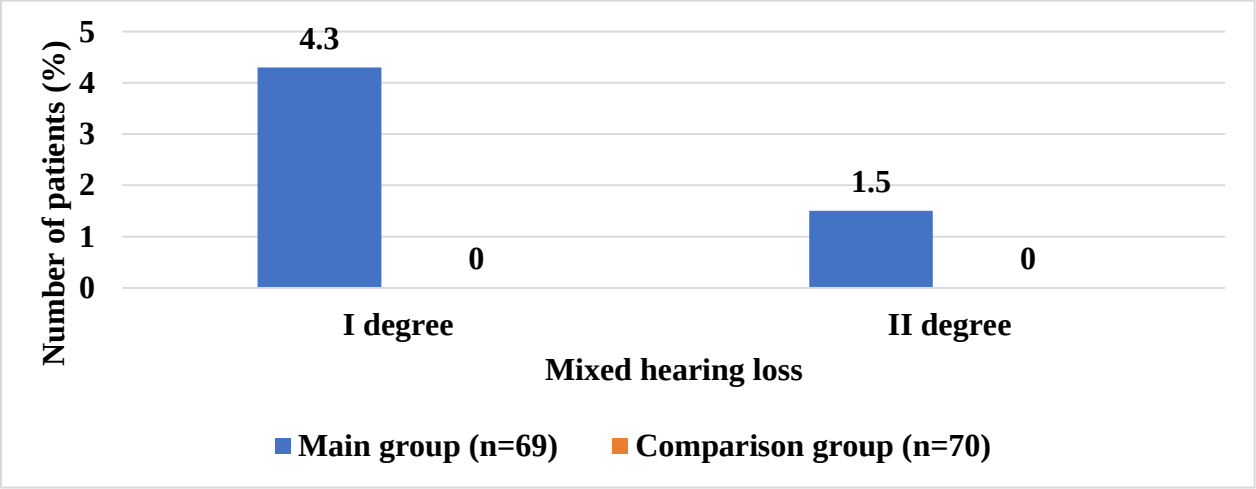

Figure 6. Pre-treatment audiological scores (mixed hearing loss) (each ear assessed separately).

In patients with EOM in case of BNN, PS and NP, hearing loss is observed as conductive type 94.2% and mixed type 5.8%, in contrast to the EOM group with CRS, where only conductive type of hearing loss of 100% occurs. Patients with EOM in the case of BNN, PS and NP significantly more often have II degree of hearing loss (52.2%), patients with EOM in CRS I degree of hearing loss (68.6%).

Table 2 presents threshold audiometry data in the groups of examined patients before treatment.

Noteworthy are the differences between the compared groups in air conduction at all frequencies studied: the thresholds for the perception of sounds through air are on average 1.4 times higher in patients with EOM on the background of benign neoplasms, which is explained by more pronounced pathological changes. When analyzing bone conduction, a significant difference was noted at a frequency of 500 Hz.

Table 2

Results of pure tone threshold audiometry before treatment, dB (M±m) (each ear was assessed separately)

frequency Hz		EOM for BNN, PS and NP (n=69)	EOM for CRS (n=70)	Mann-Whitney test P-value
Air conduction	500	43,59±4,83	35,26±5,21	<0,001
	1000	45,81±3,72	32,43±3,76	<0,001
	2000	45,11±4,98	31,19±4,21	<0,001
	4000	43,79±3,94	31,48±3,83	<0,001
Bone conduction	500	10,83±1,11	8,28±0,81	0,03
	1000	11,79±0,84	10,94±1,33	0,44
	2000	13,59±0,76	12,29±0,73	0,19
	4000	12,49±0,71	11,69±0,93	0,05

Note: p - level of significance of differences.

Microbiological examination of smears from the nasal mucosa was carried out in all study groups. The qualitative composition of the microbial landscape is presented in Figures 7 and 8.

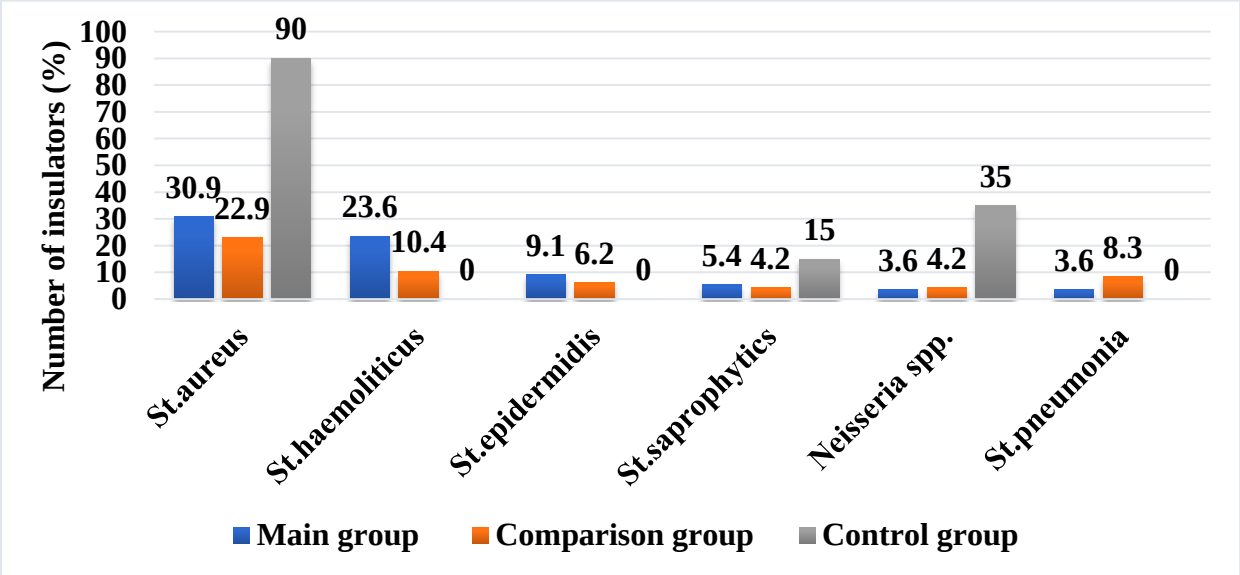

Figure 7. Qualitative composition of the microbial landscape of the nasal mucosa

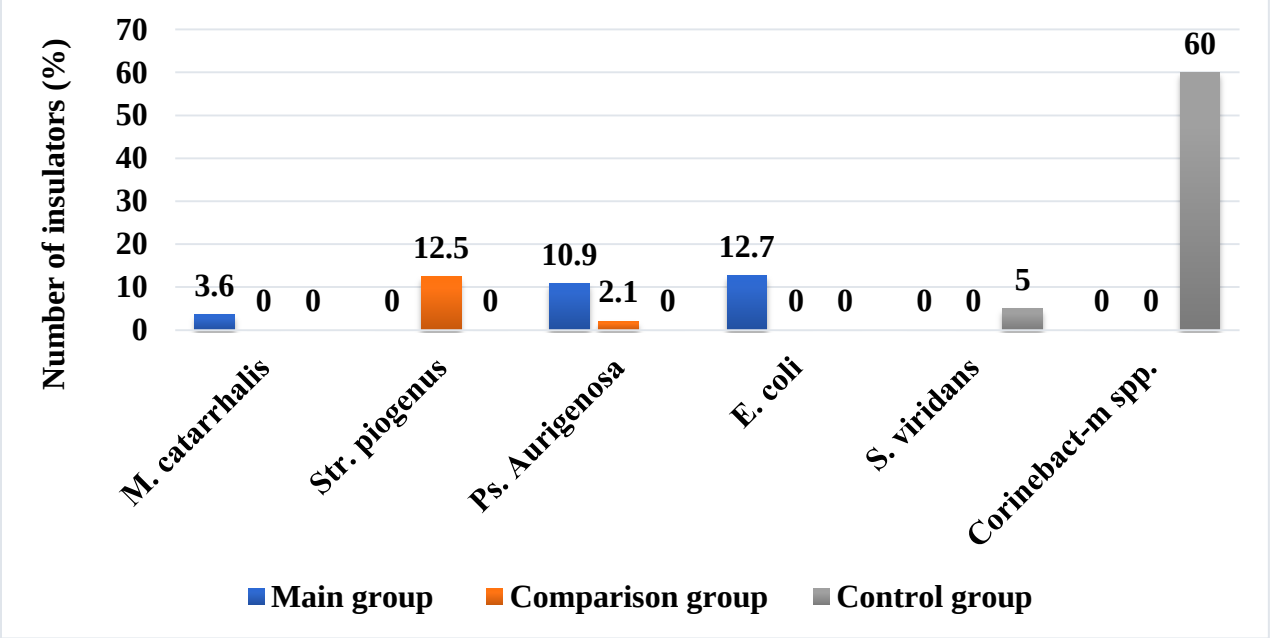

Figure 8. Qualitative composition of the microbial landscape of the nasal mucosa.

As can be seen from the figure, significant differences were found in the types of microbial agents on the nasal mucosa in patients of all three groups. According to the frequency of occurrence in patients with EOM with BNN, PS and NP, the gram-positive flora is dominated by anaerobes St. aureus 30.9%, St. haemolyticus 23.6%, from gram negative flora E. coli 12.7% and Ps. aeruginosa 10.9%, while in patients with EOM in CRS, Str. piogenus 12.5%.

The predominance of anaerobic flora is associated with a violation of the patency of the nasal passages and natural anastomoses, which creates favorable conditions for the life of these types of microorganisms. In the control group, 18 patients are carriers of St. aureus 90.0%, and opportunistic microorganisms Corinebacterium spp. are also sown. 60.0%, Neisseria spp. 35.0%. Also in isolated cases, St. saprophytics – 15% and S. viridans – 5%.

During the study, immunological parameters in the compared groups were studied (Table 3).

Table 3.

Indicators of immune status in patients with EOM in the compared groups

Indicators	EOM for BNN, PS and NP (n=48) (M±m)	EOM for CRS (n=21) (M±m)
CD3+	46,87±7,57	61,77±6,21*
CD4+	26,39±7,39	40,72±6,43*
CD8+	16,06±2,45	33,50±2,21*
CD19+	20,21±2,53	19,82±2,51
IgA	1,06±0,21	1,32±0,08*
IgM	2,81±0,24	1,57±0,25*
IgG	6,32±0,79	10,46±0,86*
IgE	96,2±7,59	77,78±6,26*

Note: * - statistically significant difference.

In the comparison group, CD3+, CD8+ and T-helper cells - CD4+ were found in large numbers. As is known, chronic inflammation is associated with the activation of immunocompetent cells, which may explain the results obtained. Thus, it can be stated that in patients with EOM against the background of BNN, PS and NP, in comparison with EOM during CRS, there was a significant decrease (on average 1.5 times) in the relative number of CD3+ and the level of their main subpopulations CD8+, CD4+.

Indicators of humoral immunity - the concentration of serum immunoglobulins in the study groups also differed: in the main group, a significant decrease in the level of IgA was detected - 1.06 ± 0.21 g/l ($p < 0.01$), a decrease in IgG - 6.32 ± 0.79 g/l l ($p<0.05$), but the IgM content of 2.81±0.24 g/l ($p<0.01$) was significantly high.

Conclusions:

1. With exudative otitis media against the background of benign neoplasms of the nose, paranasal sinuses and nasopharynx, along with gradually increasing otological symptoms, characterized by a unilateral impairment of the functional state of the ear 74.5% (impaired ventilation function of the auditory tube III-IV degree, conductive and mixed type of hearing loss I-II degree, the presence of pathological tympanograms of type B), nasal symptoms are noted (impaired nasal breathing, foreign body sensation, nosebleeds). The combination of these symptoms may be a criterion for cancer alertness.

2. Exudative otitis media with benign neoplasms of the nose, paranasal sinuses and nasopharynx is characterized by a long-term presence of exudate in the tympanic cavity, as evidenced by the characteristic endoscopic sign of a “spoked wheel”, so the sensitivity of the method was 92.7%, the specificity was 95%, and the diagnostic value of the method was 93. 6%.

3. The immune status of patients with exudative otitis due to benign neoplasms of the nose, paranasal sinuses and nasopharynx is characterized by a 1.5-fold decrease in the average values of T-lymphocytes. In particular, a significant decrease in the relative number of CD3+ and the level of their main subpopulations CD8+, CD4+ was revealed. Against the background of a significant deficiency of IgA, IgG, significantly high levels of IgM were revealed.

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