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## Research Article

# FEATURES OF MYCOLOGICAL AND CLINICAL STUDIES OF OTOMYCOSIS

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## ABSTRACT

The results of our studies made it possible to determine the main pathogenetic factors in the development of otomycosis in the examined patients, which is especially important; since fungi - causative agents of otomycosis are conditionally pathogenic microorganisms and show their pathogenic properties only under certain conditions. We found that an important factor for the development of otomycosis is the presence of general somatic diseases, which, according to the present study, were present in the majority (70.1%) of patients, which indicates a decrease in the body's resistance to opportunistic flora against the background of chronic diseases, various metabolic disorders. 25.7% of patients had diseases of the gastrointestinal tract, in which dysbiosis develops with a decrease in the proportion of obligate microflora, a decrease in natural resistance to fungal flora. Diseases of the cardiovascular system of varying severity, including myocardial infarction, were found in 23.45% of patients. The fact that in 32 patients otomycosis developed against the background of diabetes mellitus testifies in favor of the pathogenetic significance of carbohydrate metabolism disorders in the development of mycosis. A small number of observations and the results obtained did not allow us to state with certainty that there is a direct relationship between the incidence of otomycosis

and antibiotic therapy. Analysis of our clinical material showed that prior to the diagnosis of otomycosis, systemic antibiotic therapy according to the anamnesis was carried out in 20 patients, local - in 9 patients (a total of 29 patients - 7.1% of the number of patients with otomycosis).

We found that traumatic factors in the form of a systematic toilet of the ear canal with a cotton swab, removal of sulfuric plug, use of endoural headphones play an important role in the development of fungal ear infections. Against the background of trauma, otomycosis developed in 56.5% of patients.

## KEYWORDS

Otomycosis, ear, pain, otitis media.

## INTRODUCTION

In recent years, mycoses with their diverse localization and clinical manifestations have been studied in depth by doctors of various specialties. Thus, according to WHO data, 20% of the world's population, i.e. every fifth inhabitant of the planet is affected by a fungal infection [1]. The wide distribution of fungi in nature, their constant presence, both in the environment and in the body, makes it inevitable that contacts and infection of a person are inevitable. Currently, there is an increase in the number of patients with mycotic lesions of the ENT organs and, in particular, the outer and middle ear, including postoperative cavities of the middle ear. The increase in the number of patients is due to both a significant increase in risk factors for the development of mycosis, and unsystematic uncontrolled use of local antibacterial drugs in the treatment of otitis media. In addition, there is a trend towards the development of resistance of the mycosis fungus to specific antifungal drugs [2]. An increase in the proportion of chronic fungal inflammation with frequent relapses that are not amenable to drug correction has been noted, which, in turn, leads to an

increase in the period of disability and disability of the population [3].

An increase in fungal diseases among the population and an increase in the number of fungal lesions of the skin and mucous membranes is an urgent problem for modern medical mycology [4]. The number of patients hospitalized for fungal diseases of the upper respiratory tract increases annually.

Otomycosis, a fungal infection of the ear, is a widespread disease. The proportion of otomycosis among inflammatory diseases of the ear is up to 18% in adults and up to 26.3% in children. According to 50% of all mycoses of ENT organs is otomycosis.

The high prevalence of otomycosis among the population, the lack of effectiveness of treatment and the very frequent occurrence of relapses of the disease makes it necessary to look for new optimal means and methods for the treatment of otomycosis [5].

Among the methods of treatment, the local treatment of otomycosis is of the greatest importance. At the

same time, the choice of a method for delivering a medicinal substance to the focus of pathology is a decisive moment for the successful treatment of the disease. For the treatment of diseases of the outer ear, various methods of delivering drugs to the pathological focus are traditionally used by the introduction of solutions and ointments, by electrophoresis, transportation of the drug together with dimethyl sulfoxide and laser photochemotherapy [6].

In recent years, a number of authors consider the use of immobilized drugs of prolonged action to be promising for local therapy of various diseases. The use of these drugs can reduce the toxicity of drugs, reduces the likelihood of allergic reactions and the severity of side effects, and also reduces the dose of drugs. The use of gelatin films for treatment makes it possible to deliver the medicinal substance directly to the focus of the pathology or as close as possible to it, the medicinal substance is released in a given place, which makes it possible to increase the effectiveness of treatment [7-11].

Despite the currently available research on the diagnosis and treatment of otomycosis [11], a number of theoretical and practical issues of this problem remain unexplored. These include the lack of optimal means for the treatment of otomycosis and methods for delivering drugs to the focus of pathology. The microbiological features of the microflora of the upper respiratory tract and the outer ear in the conditions of the North have not been studied [12-14]. The effectiveness of the use of gelatin films in the treatment of otomycosis has not been determined. Possibilities of local treatment of the disease are insufficiently used. The systematic analysis of the diagnosis and treatment of otomycosis with gelatin

films has not been sufficiently implemented, which makes it difficult to prevent and treat otomycosis.

Material and methods. As a result of an eight-year observation period in the provision of specialized medical care on the basis of a multidisciplinary TMA clinic, 68 patients with inflammatory ear diseases were diagnosed with otomycosis, which were included in this work.

All patients underwent a general clinical examination: clarification of complaints, collection of an anamnesis of the disease and life, a general blood test, a general urine test. An otorhinolaryngological examination was carried out: external examination of the ENT organs, rhinoscopy, pharyngolaryngoscopy, otoscopy using an ear funnel, using a magnifying technique (Ziegle funnel, otoscope, operating microscope). The study of hearing included checking the perception of whispered and colloquial speech, if necessary, a tuning fork study was performed (appointed), tone threshold audiometry.

## RESULTS AND DISCUSSION

When interviewing patients with otomycosis, the nature of complaints, the duration of the disease, concomitant diseases, risk factors, previous episodes of treatment and the effectiveness of treatment, as well as an anamnesis of life and profession, were ascertained.

During the initial treatment, the patients presented various complaints, the nature of the complaints and their number changed during the treatment. Complaints of patients with otomycosis during the initial examination are presented in Table 1.

Table 1

Table 1

Complaints of patients with otomycosis during the initial examination.

Indicator	Total	%
Number of persons of them complained about:	68	100
Itching in the ear	34	50
Feeling of stuffy ear	32	45,5
Ear pain	28	41,2
Ear discharge	20	29,4
Discomfort in the ear	11	16,2
Hearing loss	7	10,3
Feeling of moisture in the ear	3	4,4
Noise in the ear	3	4,4
Increase in body temperature	2	2,9

From Table 1 it follows that the main complaints of patients were complaints of itching in the ear - 50%, a feeling of stuffiness in the ear - 45.5%, pain in the ear - 41.2%, discharge from the ear - 29.4%, which corresponds to the literature data. .

In order to detail the complaints, the complaints of patients with acute, chronic otomycosis during and without exacerbation of otomycosis were analyzed separately. Complaints of patients with otomycosis in acute and chronic course of the disease are presented in table 2.

Table 2

Complaints of patients with otomycosis in acute and chronic course of the disease

Indicator	Acute otomycosis	Chronic otomycosis, exacerbation	Chronic otomycosis, without exacerbation

	A6c.	%	A6c.	%	A6c.	%
Number of persons of them complained about:	20		19		29	
Itching in the ear	9	45	8	42,1	17	58,6
Feeling of stuffy ear	7	35	12	63,2	12	41,4
Ear pain	10	50	12	63,2	6	20,7
Ear discharge	6	30	10	52,6	4	13,8
Discomfort in the ear	2	10	2	10,5	7	24,1
Hearing loss	4	20	1	5,3	2	6,8
Feeling of moisture in the ear					3	10,3
Noise in the ear	2	10	1	5,3		
Increase in body temperature	1	5	1	5,3		

From Table 2, it follows that in patients with acute otomycosis, the first place is for complaints of pain in the ear (50.0%), the second place is for complaints of itching in the ear (45.0%), and the third place is for complaints of a feeling of congestion in the ear (35.0%). For patients with chronic otomycosis during

exacerbation, in the first place, complaints of pain in the ear and a feeling of congestion in the ear (63.2%), in the second place, complaints of discharge from the ear (52.6%), and in the third place, complaints of itching in the ear (42.1%). In patients with chronic otomycosis without exacerbation, in the first place were



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complaints of itching in the ear (58.6%), in the second place were complaints of a feeling of stuffiness in the ear (41.4%), in the third place were complaints of discomfort in the ear (24.1%).

In order to determine the diagnostic significance of complaints in various forms of the course of

otomycosis, the complaints of patients with acute otomycosis, chronic otomycosis during exacerbation, and chronic otomycosis without exacerbation were analyzed separately. The diagnostic significance of complaints of patients with acute otomycosis is presented in Table 3.

Table 3

Diagnostic significance of complaints of patients with acute otomycosis

Indicator	healthy, n=30		Acute otomycosis, n=20		DC	I
	Abs.	%	Abs.	%		
Number of persons of them complained about:	30		20			
Itching in the ear	1	3,3	9	45	11	1,7
Feeling of stuffy ear			7	35	10	1,3
Ear pain			10	50	11	2
Ear discharge			6	30	10	0,6
Discomfort in the ear	1	3,3	2	10	5	0,2
Hearing loss			4	20	8	0,3
Feeling of moisture in the ear					2	0,2
Noise in the ear			2	10	5	0,2

Increase in body temperature			1	5	2	0,2
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Note: \* - sufficient information content of indicators at 1 min = 0.5.

From Table 3 it follows that the most significant diagnostic coefficient in acute otomycosis had complaints of patients with itching (DK=11) and pain in the ear (DK=11), in second place were complaints of a feeling of congestion in the ear (DK=10) and discharge

from the ear (DK=10) and in third place were complaints of hearing loss (DK=18).

The diagnostic significance of complaints of patients with exacerbation of chronic otomycosis is presented in Table 4.

Table 4.

Diagnostic significance of complaints of patients with exacerbation of chronic otomycosis

Indicator	Healthy, n=30		Chronic otomycosis, exacerbation, n=19		DC
	Abs.	%	Abs.	%	
Number of persons of them complained about:	30		19		
Itching in the ear	1	3,3	8	42,1	11
Feeling of stuffy ear			12	63,2	13

Ear pain			12	63,2	13
Ear discharge			10	52,6	12
Discomfort in the ear	1	3,3	2	10,5	6
Hearing loss			1	5,3	2
Feeling of moisture in the ear					2
Noise in the ear			1	5,3	2
Increase in body temperature			1	5,3	2

From Table 4 it follows that the most significant ear (DK=12) and in third place were complaints of itching in the ear (DK=11). The diagnostic significance of diagnostic coefficient in exacerbation of chronic otomycosis had complaints of patients about a feeling of stuffiness in the ear and pain in the ear (DK=13), in second place were complaints of discharge from the complaints of patients with chronic otomycosis without exacerbation is presented in Table 5.

Table 5.

**Diagnostic significance of complaints of patients with chronic otomycosis without exacerbation**

Indicator	Healthy, n=30		Chronic otomycosis, without exacerbation, n=29		DC
	Abs.	%	Abs.	%	
Number, people of them complained about:	30	100	29		

Itching in the ear	1	3,3	17	58,6	13
Feeling of stuffy ear			12	41,4	11
Ear pain			6	20,7	8
Ear discharge			4	13,8	6
Discomfort in the ear	1	3,3	7	24,1	9
Hearing loss			2	6,8	3
Feeling of moisture in the ear			3	10,3	5
Noise in the ear					
Increase in body temperature					

From table 5 it follows that the most significant diagnostic coefficient for chronic otomycosis without exacerbation had complaints of patients with itching in the ear (DK=13), in second place were complaints of a feeling of stuffiness in the ear (DK=11) and in third place were complaints of discomfort in the ear (DK=9).

If we group the main complaints regarding the nature of the course of otomycosis, then we can conclude that complaints of pain in the ear prevail in acute otomycosis (DK = 11) and exacerbation of the chronic process (DK = 13), complaints of itching in the ear are leading in patients with chronic otomycosis without exacerbation (DK=13). Complaints about ear congestion are equal in frequency to complaints of pain in the ear during an exacerbation of a chronic process (63% of patients, DC=13), in contrast to complaints in acute otomycosis, for which complaints of ear congestion are less common (35% of patients, DC=10 ), which may indirectly indicate their specificity

for the exacerbation of chronic mycotic processes in the ear.

A separate group of complaints consisted of complaints of discomfort in the ear and a feeling of moisture in the ear. Complaints of discomfort in the ear occurred in 24.1% of cases in patients with chronic otomycosis without exacerbation (DC=9), which is two times more common than in patients with acute and exacerbation of chronic otomycosis (10.0 and 10.5% each)., DC=5 and 6, respectively). Patients with chronic otomycosis without exacerbation complained about the feeling of moisture in the ear (10.3% of patients, DK=5), and it was not present in groups with acute and exacerbation of chronic otomycosis (DK=2), which makes this complaint rather specific.

Indicators of the diagnostic coefficient and informativeness of complaints and clinical

manifestations in patients with otomycosis are presented in Table 6.

Table 6

Indicators of the diagnostic coefficient (DC) and information content (I) of signs of otomycosis

Complaints	Acute otomycosis		Exacerbation of chronic otomycosis		Chronic otomycosis without exacerbation	
	DC	I*	DC	I*	DC	I*
Itching in the ear	11	1,7	11	1,7	13	1,8
Feeling of stuffy ear	10	1,3	13	1,6	11	1,3
Ear pain	11	2,0	13	2,1	8	0,6
Ear discharge	10	0,6	12	0,6	6	0,5

Note: \* - sufficient information content of indicators at I min = 0.5.

From table 6 it follows that complaints of itching in the ear, a feeling of stuffiness in the ear and pain in the ear are the most informative (I=0.6-2.0), clinical manifestations in the form of discharge from the ear are less informative (I=0.5- 0.6).

In 180 patients, the causative agent of the fungal disease was mold fungi. Pathological discharge in the external auditory canal of the affected ear was present in all patients. At the same time, the nature of the pathological secretion depended on the type of pathogen fungus. So in 83 patients, the discharge had

a caseous character with black patches, resembling a “wet newspaper” (Fig. 3.1). A purulent-caseous plug in the bone part of the external auditory canal with air filaments of mycelium, which made it possible to diagnose a fungal disease without waiting for the results of sowing, was noted by us in 79 patients (Fig. 3.2). After removal of caseous masses, damaged skin was exposed, mainly in the bone part of the ear canal with flaccid granulation tissue. In 10 patients (pathogens were fungi of the genus *Renicillhim*), the discharge in the external auditory canal was dark yellow, with brown inclusions.



Figure 3.1. Fungal otitis externa. Caseous discharge with black patches in the external auditory canal. Otomicroscopy. magnification x 16. Pathogen - *Aspergillus niger*.

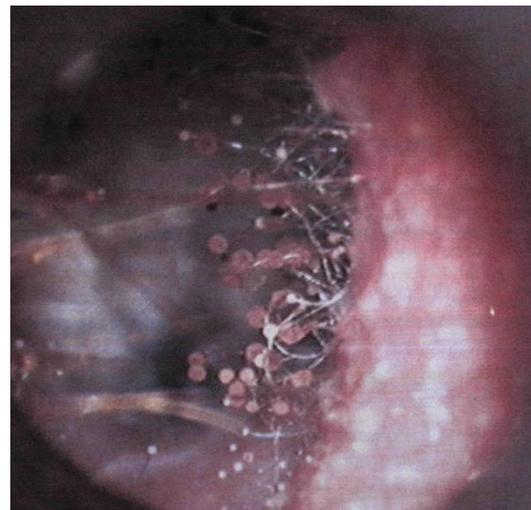


Figure 3.2. Fungal otitis externa. Purulent-caseous film with aerial mycelium. Otomicroscopy. magnification x 24. Pathogen - *Rhizomucor* spp.

Infection by *Aspergillus* fungi, detected in 162 patients (57.85%), was accompanied by complaints of ear pain, discharge of a different nature. On examination, a “fungal body” was visualized in the bony part of the external auditory canal. The tympanic membrane was hyperemic in 109 patients, injected with blood vessels

in 42. Shortening of the light reflex was observed in 172 patients. In 6 patients, the fungal process was localized only on the eardrum. After removal of the fungal body from the tympanic membrane, granulation tissue was exposed, the tympanic membrane was hyperemic, and there was no light reflex. In another 12 patients, against



the background of severe infiltration of the skin of the external auditory canal, accompanied by a narrowing of its lumen to 2/3 or more, during examination, we did not detect elements of the fungal body, but only separate films of the pathological discharge, but with microscopy of the native preparation and in the sowing, molds were determined. mushrooms.

In patients with candidiasis of the skin of the external auditory canal - 100 people - pathological cheesy discharge in the external auditory canal was present in 53 patients. Eczematous changes in the skin of the external auditory canal were noted in all patients. The tympanic membrane was intact in 89 patients, and only in 11 patients, after the removal of mycotic masses, its hyperemia was noted. In 2 patients, the tympanic membrane was infiltrated.

Clinical and mycological studies carried out by us made it possible to establish the diagnosis of fungal otitis externa in 280 patients.

All patients, regardless of the type of fungal infection, underwent a complex of laboratory tests. The result is presented in table 6. It was found that in 180 patients the pathogens of the process were various mold fungi. The bulk is represented by the species *A. niger*—133 observations, in 21 patients the fungus *A. fumigatus* was identified as the causative agent, in 8 patients

other types of aspergillus were identified. In 10 patients, the pathogens were fungi of the genus *Penicillium*, in 6 patients - fungi of the genus *Mycor*.

In 100 patients, the causative agents of the fungal disease were yeast-like fungi of the genus *Candida*. In 21 patients, the causative agent of the inflammatory process was the fungus *Candida albicans*, in 17 patients - *Candida tropicalis*, in 6 patients - *Candida sake*. The causative agents of other species of *Candida* were less common. Further, in descending order, pathogens detected with the same frequency are presented. So, *Candida krusei* and *Candida parapsilos* is detected in 5 patients; *Candida pseudotropicalis* and *Candida glabrata* - in 3 patients; *Candida hellermanii*, *Candida ciferrii*, *Candida dubliniensis* - in 2 patients; *Candida famata*, *Candida globosa*, *Candida curvata*, *Candida intermedia* - each in 1 patient. In 30 patients, other *albicans* strains of fungi of the genus *Candida* were isolated.

15 patients had a combined infection with mold and yeast-like fungi. At the same time, *A. niger* accounted for 13 cases and *A. fumigatus* - 2 cases. Among fungi of the genus *Candida*, the species *albicans* (12 observations) was more common in the association than *krusei* (3 observations). The results obtained are presented in table 7.

Table 7

Causative agents of fungal external otitis.

Pathogen		Total	
Aspergillus	Niger	13	57,8%
	Fumigatus	7	
	Spp.	1	

Penicillium spp.		5
Mucor spp.		2
Rhizomucor spp.		1
<b>Whole filamentous mushrooms</b>		<b>24 (67,5%)</b>
Candida	C. albicans	14
	C. tropicalis	9
	C. sake	6
	C. krusei	1
	C. parapsilosis	5
	C.pseudotropicalis	1
	C. glabrata	3
	C. hellermanii	2
	C. ciferrii	1
	C. dubliniensis	1
	C. famata	1
	C. globosa	1
	C. curvata	1
	C. intermedia	2
	Candida spp.	1
<b>Total yeast-like fungi</b>		<b>6</b>
<b>Total</b>		<b>68</b>

Note: \* Mushrooms included in associations are marked.

Thus, the main causative agents of fungal otitis externa are fungi found in 180 patients (64.3%), while the genus *Aspergillus* accounted for 162 observations (57.85%). Yeast-like fungi were identified as an etiological factor in 100 observations (35.7%), while the most pathogenic fungus *Candida albicans* was identified only in 21 patients. The second most important species is *Candida tropicalis*, isolated from 17 patients with external fungal otitis.

In all 72 patients examined by us with fungal otitis media, the main complaints were discharge from the patient yxa and hearing loss (100%). All fungal lesions of the middle ear (accompanied by suppuration. Discharges were mainly: liquid with (candidiasis and thicker with mold mycosis. Pain in the affected; ear bothered 69 patients (95.8%), headache on the side of the affected ear was noted only by 62 patients (86.1%) itching in the diseased ear periodically occurred in 54 patients (75%) during the period of regression-fungal process and was paroxysmal in nature. ; in 53 patients. 19 patients described the noise as low-frequency (hum, the sound of the surf). The feeling of fullness, "bursting" in the ear bothered 57 patients.

Complaints of dizziness, which is non-systemic, were presented by 28 patients.

When comparing the complaints of patients with external fungal otitis media and fungal otitis media, it can be concluded that with otitis media, hearing loss, noise, ear pain bothered almost all patients. Dizziness was noted in 1/3 of patients, while with external fungal otitis it occurred only in 3%. These significant differences are important in diagnosing the localization of mycosis.

The tympanic membrane was perforated in all patients, while in 67 the perforation was located in the tense part (in 23 in the lower sections, in 19 in the upper, in 25

there was a subtotal or total defect), and in 5 patients there was a fistulous tract in the attic.

On examination, various changes in the skin of the ear canal and mucous membrane of the middle ear were noted.

48 patients had a pronounced edema and infiltration of the skin of the external auditory canal, while the narrowing of the lumen by 1/3 was present in 23 patients, up to 2/3 - in 13 patients, complete narrowing - in 12 patients. A more significant narrowing of the lumen was with mold mycosis. In 24 patients, narrowing of the lumen of the auditory canal was not observed, however, eczematous skin changes were more pronounced. These clinical observations indicate that the fungal lesion of the middle ear was combined in these patients with a fungal lesion of the external auditory canal.

In 57 patients with otitis media, the causative agent of the fungal disease was yeast-like fungi of the genus *Candida*. Abundant purulent discharge in large quantities (soaking up to 8 "quilted jackets") was not only in the tympanic cavity, but also in the external auditory canal. The viscosity of pus varied from thick to liquid, the consistency was often homogeneous.

In 15 patients, the causative agent of otitis was filamentous fungi. Pathological discharge in the auditory canal of the affected ear, spreading through the perforation of the tympanic membrane into the cavity of the middle ear, was present in all patients and depended on the type of fungus - pathogen. So, discharge of the type of "wet newspaper" - caseous in nature with black patches (Fig. 3), was observed in 9 patients with aspergillosis. A purulent-caseous plug in the bone part of the auditory canal with air filaments<sup>1</sup> of the mycelium (like a cotton ball) (Fig. 4) was noted by us in 2 patients. Upon removal of caseous masses,

hyperemia and infiltration of the skin in the bone part of the auditory canal, tympanic membrane, mucous membrane of the tympanic cavity were revealed, flaccid granulation tissue was exposed. In 4 more patients with aspergillosis, during examination, we detected only granulation tissue along the edge of the perforation of the tympanic membrane, membrane, and only with microscopy of the native preparation and sowing of pus, the presence of mold fungi was determined.

An audiological examination revealed a decrease in hearing in the diseased ear in all patients due to impaired sound conduction, which was caused by perforation of the tympanic membrane. Hearing loss

varied from the first to the fourth degree (according to V.G. Ermolaev, A.L. Levin). However, 19 patients had hearing loss in the diseased ear due to sound perception. The degree of increase in thresholds for bone conduction varied from the third to the fourth.

All patients, regardless of the type of fungal infection, underwent a complex of laboratory tests.

The result of mycological studies is presented in Table 8. It was found that in fungal otitis media, yeast-like fungi of the genus *Candida* dominated, identified in 79.2% of cases, in second place were filamentous fungi of the genus *Aspergillus* (20.8%).

Table 8

Causative agents of fungal otitis media.

Pathogen		Total
Candida	<i>C. albicans</i>	14
	<i>C. krusei</i>	8
	<i>C. sake</i>	3
	<i>C.pseudotropicalis</i>	1
	<i>C. parapsilosis</i>	4
	<i>C.tropicalis</i>	1
	<i>C. Hellemanii</i>	1
	<i>C. glabrata</i>	2
	<i>C.famata</i>	1
	<i>Candida spp.</i>	1
<i>Aspergillus niger</i>		4

Aspergillus fumigates	1
Aspergillus spp.	2
Mucor spp.	1
<b>Total</b>	<b>29</b>

Among 57 patients in whom the causative agents of the fungal disease were yeast-like fungi of the genus *Candida*, the fungus *C. albicans* was in the first place in terms of frequency of detection (14 patients). Then, in descending order, follow *C. krusei* - (13 patients), *C. sake* (7 patients), *C. pseudotropicalis* (5 patients), *C. parapsilosis* (3 patients), *C. tropicalis* and *C. hellermanii* (2 patients each), *C. glabrata* and *C. famata* (1 patient each). Other non-*albicans* strains of fungi of the genus *Candida* were isolated from 9 patients.

15 patients with the causative agent of otitis had various mold fungi. The main mass is represented by fungi of the species *A. niger* - 10 observations, in 2 more patients the causative agent of the inflammatory process was the fungus *A. fumigatus*, in 2 more patients other types of aspergillus were detected. In 1 patient, as a result of the study, a fungus of the *Mycor* genus was detected.

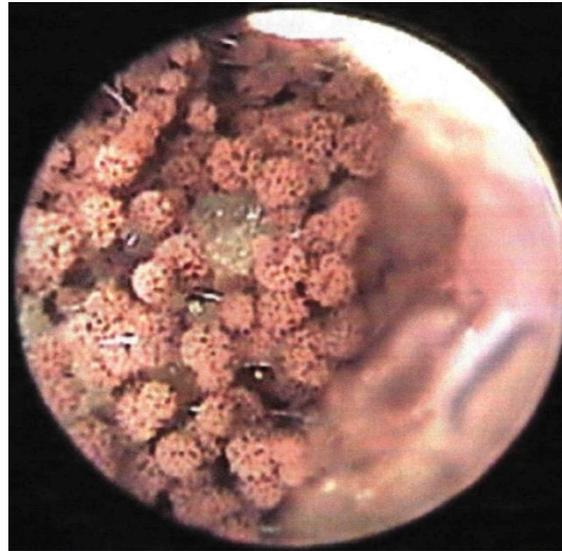
All 53 patients had colored discharge from the ear (100%). The nature of the secretions varied from liquid and thick to dry (crusts, films). Pain in the affected ear bothered 50 patients (94.3%), only 42 of them (86.1%) reported headache on the side of the affected ear. Itching in the diseased ear periodically occurred in 40 patients (75%) during the regression of the fungal process and was paroxysmal in nature.

The noise in the affected ear bothered all patients, and more often could be attributed to low-frequency in the form of a hum, surf noise (noted in 34 patients) or high-frequency, described as a mosquito squeak, ringing (19 patients).

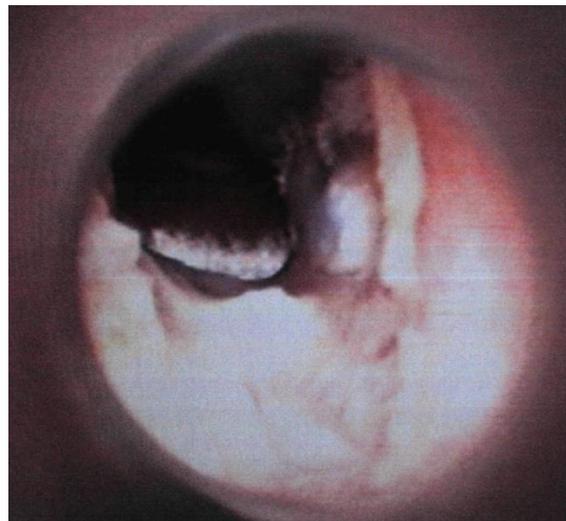
27 patients complained of a feeling of fullness, "bursting", heaviness in the operated ear. Dizziness, which is non-systemic in nature, bothered 25 patients (47.16%). This is undoubtedly a very important sign, since such a frequent complaint, apparently, may be the result of mycotic intoxication and should especially alert doctors to a more in-depth examination of the vestibular function in this group of patients. All these data are reflected in table 22.

On examination, it was revealed that the postoperative cavity in almost all 47 patients with aspergilloidosis was filled with caseous masses resembling a "wet newspaper", in 38 cases aerial mycelium with ripe conidia was found (Fig. 3.3). In 3 patients, the fungal body in the postoperative cavity resembled a ball of cotton wool (Fig. 3.4).

The postoperative cavity in patients with candidiasis was filled with thick pus of heterogeneous consistency with whitish inclusions..



**Figure 3.3. Mycosis of the postoperative cavity. Caseous crust with aerial mycelium with mature conidia. Endoscopy, magnification x 40. Pathogen - Aspergillus niger.**



**Figure 3.4. Mycosis of the postoperative cavity. Detachable by the type of "piece of cotton wool". Otomicroscopy, magnification x 8. Pathogen - Aspergillus niger.**

Upon removal of the purulent caseous discharge, bleeding granulation tissue was exposed. Epithelialization of the postoperative cavity was incomplete. The largest amount of granulation tissue was observed behind the "spur".

We have noted that fungal infection of the postoperative cavities of the middle ear develops in patients who underwent radical general cavity surgery. Sanitizing operation on the middle ear with tympanoplasty is complicated by the development of mycosis 2 times less often.

Thus, in our opinion, some help in clarifying the localization of the process can be provided by the presence of such signs as headache on the side of the lesion, a feeling of fullness, dizziness and the nature of the noise, the frequency of which varies significantly in fungal external or otitis media.

We found that in fungal lesions of postoperative cavities of the middle tract, mold fungi were the predominant pathogens, the proportion of which was 94.3% of the total number of patients with this pathology (Table 9).

Table 9

**Mycological characteristics of fungal postoperative otitis.**

Pathogen	Total
Aspergillus niger	7
Aspergillus fumigates	3
Aspergillus spp.	2
Mucor spp.	1
Rhizomucor spp.	2
Candida albicans	3
Candida spp.	2
<b>Total</b>	<b>14</b>

At the same time, fungi of the genus *Aspergillus*, isolated in 88.67% of cases from all patients, turned out to be the most pathogenic, and only 5.66% accounted for fungi of the genus *Candida*. These results - the dominance of mold fungi in this pathology - can be sufficiently convincing when considering the pathogenesis of otomycosis of this localization. Some authors believed that fungal postoperative otitis is diagnosed in the vast majority of patients with unrecognized fungal otitis media before surgery. But the results of our mycological studies do not confirm this, since significant differences were found among

the fungi of the causative agents of the disease in otitis media and mycosis of the postoperative cavity.

The fact that molds dominate in mycosis of the postoperative cavities of the middle ear, which we have established, must be taken into account when prescribing treatment, since all molds have a natural resistance to fluconazole.



## CONCLUSION

The results of our studies made it possible to determine the main pathogenetic factors in the development of otomycosis in the examined patients, which is especially important; since fungi - causative agents of otomycosis are conditionally pathogenic microorganisms and show their pathogenic properties only under certain conditions.

We found that an important factor for the development of otomycosis is the presence of general somatic diseases, which, according to the present study, were present in the majority (70.1%) of patients, which indicates a decrease in the body's resistance to opportunistic flora against the background of chronic diseases, various metabolic disorders. 25.7% of patients had diseases of the gastrointestinal tract, in which dysbiosis develops with a decrease in the proportion of obligate microflora, a decrease in natural resistance to fungal flora. Diseases of the cardiovascular system of varying severity, including myocardial infarction, were found in 23.45% of patients. The fact that in 32 patients otomycosis developed against the background of diabetes mellitus testifies in favor of the pathogenetic significance of carbohydrate metabolism disorders in the development of mycosis. A small number of observations and the results obtained did not allow us to state with certainty that there is a direct relationship between the incidence of otomycosis and antibiotic therapy. Analysis of our clinical material showed that prior to the diagnosis of otomycosis, systemic antibiotic therapy according to the anamnesis was carried out in 20 patients, local - in 9 patients (a total of 29 patients - 7.1% of the number of patients with otomycosis).

The data of many studies also indicate the presence of a direct relationship between the development of superficial and systemic mycosis in patients and long-

term (for three or more weeks) corticosteroid therapy at doses exceeding 0.5-1 mg / kg / day in terms of prednisone. Our study showed that local treatment with corticosteroids preceded the development of otomycosis in only 9 patients (2.22% of the total number of patients with otomycosis). We do not deny that corticosteroids can play the role of a risk factor for the development of mycosis, however, a small number of patients examined by us who received long-term systemic high-dose hormonal therapy in our study does not allow us to conclude that this factor has a significant effect on the development of fungal ear infections.

We found that traumatic factors in the form of a systematic toilet of the ear canal with a cotton swab, removal of sulfuric plug, use of endoural headphones play an important role in the development of fungal ear infections. Against the background of trauma, otomycosis developed in 56.5% of patients.

Thus, in the pathogenesis of fungal diseases of the ear, a wide variety of factors of endogenous and exogenous nature are important: various general somatic diseases that violate the protective mechanisms and reactions of the body, chronic inflammation. The dominant role of traumatic factors is clearly revealed. Against the background of trauma, otomycosis developed in 56.5% of patients.

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