PHOTODYNAMIC THERAPY OF PURULENT INFLAMMATION OF THE PARAPOGEAL SINUSES

Bukhara State Medical Institute

Bobokulova D.F.

Summary: The problem of diagnosis and treatment of acute and exacerbations of chronic paranasal sinusitis at present acquires greater medical and social significance.First of all, this is due to the fact that acute and exacerbation of chronic inflammation of the paranasal sinuses has a high proportion in the total structure of diseases of the ENT organs and patients with this pathology create the main area of work for outpatient otorhinolaryngologists and hospitals.

Keywords: paranasal sinuses , photodynamic therapy

According to many researchers, the world is experiencing a steady trend towards a significant increase in morbidity, transition processes into chronic ones with an increase in relapses of the disease after conservative and surgical treatment performed. It happens despite significant advances in the study of etiology, pathogenesis diseases, as well as against the backdrop of the introduction into practice of fundamentally new methods of treatment, prevention and the most powerful antibacterial and anti-inflammatory medications. (6,8,13,15,19,24). Scientific research results show that under the influence allergic, infectious, autoimmune processes occur violation of the protection systems of the mucous membrane of the upper respiratory tract with subsequent development of acute and chronic inflammation processes. IN development of a purulent process in the maxillary sinuses is important has not only the presence of the pathogen and its sensitivity to antimicrobial drugs, but also pathogenetic factors such as violation of the drainage function of the natural sinus anastomosis, decreased general and local immunoreactivity of the body (2,3,5,11, 19). Increased incidence of purulent inflammation of the paranasal

sinuses can be associated with an increase in the unjustified use of powerful antibacterial agents of the latest generation, which leads to significant inhibition of cellular and humoral factors body resistance. (1,7,10,14,17, 19,20). Pokrovsky For the development of orbital and intracranial complications inflammatory diseases of the paranasal sinuses have anatomical preconditions. Despite the variety of treatment methods for acute and exacerbations of chronic sinusitis, frequency of purulent-septic complications of these diseases continues to increase steadily.Currently it ranges from 6.6 to 12.4% among all inflammatory pathologies paranasal sinuses. In 24.4% of patients, complications arise as a result acute inflammatory processes in the paranasal sinuses, and in 75.6% - in as a result of a chronic process, while in 24% of patients from among the latter - after previously performed conservative and surgical treatment. (9,18, 20,22,23). Among modern medical technologies used in treatment a number of oncological and non-tumor diseases have a special place belongs to photodynamic therapy, recognized as the most gentle, and also, a method well tolerated by patients, allowing repeat treatment repeatedly. (5,12,16,21). Due to the decrease in the effectiveness of antibacterial therapy,the formation of strains resistant to most known antibiotics microorganisms, an increase in the number of postoperative infectious diseases complications, low effectiveness of most conventional methods therapy, duration of treatment, search for new treatment methods purulent-inflammatory processes at all stages of medical science is relevant. Currently, the most promising among them are physical methods, in particular antimicrobial photodynamic therapy.The method has pronounced bactericidal activity,anti-inflammatory effect, causes positive immune answer, prevents dystrophic and sclerotic processes. (5,12, 19,23). For the first time, the most efficient light source has been installed radiation to excite a photochemical reaction with a given photosensitizer.New, more effective alternative methods have been developed antibacterial therapy of acute and exacerbation of chronic inflammation paranasal sinuses and their purulent-septic complications, which is especially important for polyallergy to antibiotics, both severe and moderate forms of diabetes mellitus. Antimicrobial photodynamic therapy consists

of selective oxidative destruction of pathogenic microorganisms during combined effects of a dye - a photosensitizer and optical radiation of the corresponding spectral composition. Objects antimicrobial photodynamic therapy are bacteria (using both aerobic and anaerobic types of metabolism), as well as yeast and phylameptosa fungi.

At the same time, the selectivity of this technique is due to irradiation of infected areas and significantly greater sensitivity (20 - 200 times depending on the species belonging to pathogens) to photodynamic effects microorganisms compared to animal cells.

Research results and discussion: Based on the resultsstudies of the main microorganisms that make up the microbial von ENT hospital, various types of staphylococci appeared,predominantly represented by S.aureus, as well as representatives non-fermenting gram-negative microorganisms, the bulk which were representatives of the family Pseudomonadaceae, including Pseudomonas aeruginosa, as well as bacteria of the genus Acinetobacter. A significant proportion of the obtained microorganisms were yeast fungi, represented mainly by the genus Candida, as well as filamentous fungi of various genera.The vast majority of isolated hospital bacteria had polyvalent resistance to antibacterial drugs. The most significant microorganisms causing acute purulent sinusitis were representatives of facultative anaerobic coccus flora predominantly represented by S.pneumonia.Among the causative agents of exacerbation of chronic purulent sinusitis the bulk were S.aureus, Streptococcus spp., various representatives of the family Enterobacteriaceae {Klebsiella spp., Proteus spp.,E.coli), as well as associations of these microorganisms with Candida fungi spp., Aspergillus spp., Mucor spp. To study the nature of photodynamic effects on hospital strains of microorganisms, as well as to monitor the effectiveness of treatment patients with purulent pathology of ENT organs were carried out qualitatively quantitative microbiological study in dynamics. The qualitative and quantitative composition changed significantly microorganisms exposed to laser radiation with using “methylene blue” at a concentration of 20 μg/ml.Their qualitative composition was represented mainly non-fermentative gram-negative microorganisms of the genus Acinetobacter, as well as filamentous fungi, while the total

number CFU decreased to 5.7 x 102. The use of laser had a lesser antibacterial effect radiation with dilution of methylene blue at a concentration of 5 μg/ml,where the qualitative spectrum of microorganisms included, in addition to strains non-fermentative bacteria and filomentous fungi representatives family Pseudomonadaceae, including P.aeruginosa, (their the number was reduced to 4.3 x 104). When studying the antibacterial activity of laser radiation without the use of a photosensitizer - no significant effect in terms of quality spectrum or quantitative composition of microorganisms were not detected.Almost a similar picture was observed when studying exposure to different concentrations (5 and 20 μg/ml) of a photosensitizer without use of laser radiation. At the same time, the total number of CFU was 1.8 x 10, and the qualitative composition of microorganisms did not change significant changes, with the exception of staphylococcal flora, which in this case, it was represented only by the species S.aureus. When simulating the photodynamic response with LED light source, the same as when studying photodynamic reactions with laser radiation, pathological material was used already plated on brain heart agar plates. On cups a photosensitizer, methyl blue, was applied (at concentrations of 5 and 20 μg/ml) with exposure 10 minutes, then phototherapeutic LED device "AFS" with a wavelength of 675 nm at power radiation at the output of the light guide - 25 mW exposure at a distance of 3 cm from the cup for 10 minutes. Diameter light guide - 800 microns, LED power density was 0.002 W/cm2. The energy density was 3-4 J/cm2. Characterized by even lower antibacterial effectiveness exposure using a solution as a photosensitizer methylene blue at a concentration of 5 μg/ml and LED radiation.Qualitative composition of hospital microflora after exposure to this type of radiation other than non-fermenting microorganisms and phylameptose fungi already included representatives of the family Enterobacteriaceae (Proteus mirabilis, Escherichia coli (lac -)), with total the number of CFU decreased only to 7.7 x 105.When studying the antibacterial activity of LED radiation without the use of a photosensitizer - no significant effect qualitative spectrum, nor in the quantitative composition of microorganisms was not identified. When studying the effects of different concentrations (5 and 20 μg/ml)

photosensitizer without using LED radiation a similar picture was observed. At the same time, the total number of CFU was 1.3 x 10, and the qualitative composition of microorganisms did not change significant changes, with the exception of staphylococcal flora, which in this case, it was represented only by the species S.aureus. Thus, based on our data on the effectiveness photodynamic effects on nosocomial strains microorganisms and strains of microorganisms obtained from patients with acute and chronic inflammation of the paranasal sinuses and their purulent septic complications it was found that the maximum Laser radiation has antibacterial activity using methylene blue as a photosensitizer in concentration of 20 micrograms per ml.In this regard, we have developed a fundamentally new method treatment of acute and exacerbation of chronic purulent sinusitis and its purulent-septic complications. An antiseptic is used as a photosensitizer“methylene blue” in the form of an aqueous solution at a concentration of 20 μg/ml.To activate the PS, a emiconductor laser with a wavelength 660-670 nm and equipped with a fiber optic connector light guide. The light guide is installed at such a distance from the irradiated the surface of the maxillary, frontal sinus or purulent wound, painted FS so that the light spot covers its entire surface. We used photodynamic therapy in 92 patients: 56 patients with acute and 36 patients with exacerbation of chronic purulent sinusroethmoiditis.Methods of treating acute and exacerbation of chronic purulent sinusitis with the help of photodynamic therapy is as follows. After preliminary adrepalization of the nasal moves and local application anesthesia (S. Lidocaini 10%)puncture of the maxillary sinus is performed using a Kulikovsky needle (or trocar with a diameter of 4 mm), followed by washing the sinus saline solution. After washing, the solution is injected photosensitizer (methylene blue at a concentration of 20 μg/ml). The FS exposure is 10 minutes (according to the time data staining of the pathological substrate). Then into the lumen of the needle or trocar, a light guide of a therapeutic laser “Mustang” with a long length is inserted waves 0.67 microns, light exposure time 30 minutes (according to calculations radiation dose). The PDT session was carried out once a day, daily. The criterion for the number of rocedures was the relief of clinical

manifestations of the disease and microbiological examination data.We used photodynamic therapy in 49 patients: with acute 30 patients were treated with frontal sinusitis, with exacerbation of chronic frontal sinusitis 19 patients. Methods of treatment of acute and exacerbation of chronic purulent sinusitis using photodynamic therapy is as follows: After high adrenalization of the nasofrontal anastomosis, local infiltration anesthesia of soft tissues of the anterior stack of the frontal sinus 2% lidocaine solution or 0.5% novocaine solution. In a typical place trephine puncture of the frontal sinus was performed. Into the burr holea metal cannula was installed.The frontal sinus was washed saline solution, after which the solution was injected photosensitizer (methylene blue) at a concentration of 20 μg/ml, with exposure 10 minutes. A light guide is inserted into the sinus through the lumen of the cannula. To evaluate the effectiveness of antibacterial photodynamic therapy in patients with purulent pathology of the paranasal sinuses and their complications, a microbiological examination was performed – before treatment of patients, during treatment and at the end of sessions photodynamic therapy. When conducting qualitative-quantitative bacteriological research of the material, it was found that after the first session photodynamic therapy there is a progressive decrease in the amount etiologically significant pathogens.In most patients with acute purulent sinusitis, a noticeable decrease in the number of microorganisms, observed after 1-2 sessions of photodynamic therapy. In patients with phlegmon of the orbit and abscesses of the upper and lower eyelids, buccal and temporal region - after 5 sessions. After the fifth session no photodynamic effects of microbial growth were observed. During bacteriological examination of pathological material from mixed flora was isolated from a patient with acute purulent frontal sinusitis, represented predominantly by the association of obligate anaerobic microorganism. The most effective type of influence, according to what we received data is the use of laser radiation with application in as a photosensitizer methylene blue at a concentration of 20 μg/l. This type of effect has a wide spectrum of antibacterial activity, including representatives of gram-positive and gram-negative flora, as well as certain fungicidal activity. Wherein the maximum antibacterial effect is

achieved when acting on gram-positive coccal flora, as well as in relation to representatives family Enterobacteriaceae and a pronounced fungicidal effect in against yeast fungi of the genus Candida. The results of experimental and clinical studies allow recommend for implementation in outpatient and inpatient settings otorhinolaryngological practice antimicrobial method photodynamic therapy of acute and exacerbation of chronic inflammation paranasal sinuses and their purulent-septic complications. Scheme of complex treatment of purulent inflammation of the paranasal sinuses and their complications should be based on the results of the assessment in the process examination and treatment of the composition and quantity of pathogenic microflora and its antibiotic resistance. Based on our efficacy data photodynamic effect on intramacular strains microorganisms and strains of microorganisms obtained from patients with acute and exacerbation of chronic inflammation of the paranasal sinuses and their purulent-septic complications, it was found that for the development photochemical reaction in a purulent substrate is optimally used semiconductor laser radiation with a wavelength of 0.67 μm. Repeated courses of treatment do not cause development resistance to treatment and does not adversely affect health patients, no complications from the treatment were identified. Contraindications to antimicrobial photodynamic therapy is not determined, except for individual intolerance the patient's chemical formula of the photosensitizer. Carrying out antimicrobial photodynamic therapy especially indicated in patients whose purulent processes are aggravated by sugar diabetes, polyallergy to various antimicrobial drugs.

Literature:

1. U. I. Nurov, G. U. Nurova, & D. R. Rashidov (2022). THE INCIDENCE OF RHINOSINUSITIS AMONG ENT DISEASES IN SCHOOL-AGE CHILDREN. Scientific progress, 3 (4), 28-31.
2. U. I. Nurov, F. S. Ikramova, & Sh. A. Alimova (2021). FUNCTIONAL STATUS OF IMMUNE STATUS IN INFLAMMATORY DISEASES OF THE PARANASAL SINUSES IN TWIN CHILDREN. Academic research in educational sciences, 2 (5), 238-246. doi: 10.24411/2181-1385-2021-00879
3. F. S. Ikramova (2022). ETIOLOGICAL FACTORS OF RECURRENCE OF

CHRONIC PURULENT OTITIS MEDIA IN CHILDREN. Scientific progress, 3 (1),722-727.
4. Nurov U.I., & Ikramova, F.S. (2021). Features Of Non-Specific Protection Factors And Cytokine Status In Inflammatory Diseases Of The Paranasal Sinuses In Twin Children. The American Journal of Medical Sciences and Pharmaceutical Research, 3(02), 118–126. https://doi.org/10.37547/TAJMSPR/Volume03Issue02-18
5. Bobokulova D.F. (2023). MODERN APPROACH TO THE TREATMENT OF ALLERGIC RHINITIS IN CHILDREN. Ta'lim Innovatsiyasi Va Integratsiyasi, 3(1), 43–48.
6. Firangiz Suleymanovna Ikramova (2022). IMPORTANCE OF IMMUNOLOGICAL PARAMETERS IN THE CLINICAL COURSE OF PURULENT OTITIS MEDIA. Scientific progress, 3 (1), 151-156.
7. F. S., I., & Sh. A.A. (2023). Clinicofunctional Efficacy of Complex Treatment of Chronic Adenoiditis Using Phototherapy. European Journal of Medical Genetics and Clinical Biology, 1(1), 53–56.
8 Nurov U.I., Bobokulova D.F. (2023). STUDY OF THE IMMUNOBIOLOGICAL ACTIVITY OF THE MEDICINAL HERB CELANDINE . ОБРАЗОВАНИЕ И НАУКА В XXI ВЕКЕ. №43-1,84-88.
9. F.S., I., & Sh.A., A. (2023). Complex Treatment of Chronic Adenoiditis Using Phototherapy. European Journal of Medical Genetics and Clinical Biology, 1(1), 36–38.
10. Nurov, U. I., Xolov, H. N., & Umarov, U. U. (2022). Immunological Diagnosis of Severity Rhinosinusitis. Web of Scholars: Multidimensional Research Journal, 1(5), 165-167.
11. F. S., I. . (2022). The Significance of Diseases of the Gastrointestinal Tract in the Clinical Course of Allergic Rhinitis. Miasto Przyszłości, 28, 97–98.
12. Nurov, U. I., & Ikramova, F. S. (2023). Association of Allergic Rhinitis with Liver Diseases. Scholastic: Journal of Natural and Medical Education, 2(1), 131-136.
13. F. S. Ikramova, & M. M. Toyirov (2022). THE PREVALENCE OF CHRONIC SINUSITIS IN THE PEDIATRIC POPULATION. Scientific progress, 3 (4), 38-41.
14. Nurov, U. I. (2023). Clinical Features of Otitis Media in Patients with Hiv Infection. Scholastic: Journal of Natural and Medical Education, 2(1), 123-130.
15. Shahnoza Azamatovna Alimova The incidence and clinical features of otitis media in patients with hiv infection // Scientific progress. 2021. №5.

16. Бобокулова Д.Ф. (2023). МАКТАБГАЧА ВА МАКТАБ ЁШИДАГИ БОЛАЛАРДА АЛЛЕРГИК РИНИТНИНГ УЧРАШ ДАРАЖАСИ . Journal of Creativity in Art and Design. Volume: 1 Issue: 1,25-30.
17. Алимова Шахноза Азаматовна ЭТИОПАТОГЕНЕТИЧЕСКИЕ ОСОБЕННОСТИ СРЕДНЕГО ОТИТА У БОЛЬНЫХ ВИЧ-ИНФЕКЦИЕЙ // Научный прогресс. 2021. No5.
18. Nurova, G. U., and U. I. Nurov. "The current state of study of vasomotor rhinitis modern diagnostic and therapeutic methods" American journal of medicine and medical sciences-USA 10.4 (2020).
19. Шахноза Азаматовна Алимова (2021). ЧАСТОТА И КЛИНИЧЕСКИЕ ОСОБЕННОСТИ СРЕДНЕГО ОТИТА У ПАЦИЕНТОВ С ВИЧ-ИНФЕКЦИЕЙ. Научный прогресс, 2 (5), 74-81.
20. Shaxnoza Azamatovna Alimova (2022). ЭТИОПАТОГЕНЕТИЧЕСКАЯ ХАРАКТЕРИСТИКА СРЕДНЕГО ОТИТА У ВИЧ ИНФИЦИРОВАННЫХ ПАЦИЕНТОВ. Scientific progress, 3 (1), 198-207.
21. Х. Н. Нуриддинов, Ш. А. Алимова (2022). АНАЛИЗ РЕЗУЛЬТАТОВ ЭНДОСКОПИЧЕСКОЙ ДИАГНОСТИКИ И ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ПОЛИПОЗА, РИНОСИНУСИТА. Научный прогресс, 3 (5), 155-161.
22. Nurov U.I, Bobokulova D. F. (2023). Allergic Rhinitis in Young Children. Journal of Healthcare and Life-Science Research. Vol. 2, No. 3,39-44.
23. Нафиса Ботировна Саидмуродова, Шахноза Азамат Қизи Алимова, & Фирангиз Сулеймановна Икрамова (2021). ТУҒМА ТАНГЛАЙ КЕМТИКЛИГИ БЎЛГАН БОЛАЛАРДА ПАРАНАЗАЛ СИНУСЛАРНИНГ ФУНКЦИОНАЛ ҲОЛАТИ. Scientific progress, 2 (4), 404-411.
24. Ikramova F.S., & Toyirov M.M. (2022). THE PREVALENCE OF CHRONIC RHINOSINUSITIS AMONG ENT PATHOLOGIES IN PRESCHOOL AND SCHOOL-AGE CHILDREN AT THE HOSPITAL STAGE OF MEDICAL CARE. Conferencea, 463–466.