

## EFFICIENCY AND SAFETY OF USING “OZONE” IN THERAPY OF PATIENTS WITH CHRONIC TUBERCULOSIS OF THE MIDDLE EAR IN PATIENTS WITH PULMONARY TUBERCULOSIS

**Iskandarova Shahina Khamitovna**

Assistant of the department of Otorhinolaryngology № 1, Samarkand State  
Medical University

**Abstract.** Chronic tuberculosis of the middle ear (CTME) is one of the urgent problems of modern clinical otology and phthisiology. Among the various methods of treating chronic tuberculous otitis media, a rational combination of systemic etiotropic therapy of exposure to the body with local treatment is currently considered. A comparative analysis of the effectiveness of transtympanic injection of a solution of decasan 0, 002% in combination with O<sub>3</sub> in special therapeutic regimens is carried out, the advantage of this technique and its mechanism are described. The results of treatment of 20 patients are presented. All patients underwent daily ear toilet, rinsing of the middle ear cavity with antiseptic solutions followed by the introduction of a solution of decasan in combination with ozone. Despite this, in patients of group 1 (9%), group 2 (2.6%), the effect was noted.

**Key words:** chronic tuberculous otitis media, otoendoscopy, otomicroscopy, transtympanic injection of drugs, ear lavage, ozone.

**Introduction.** Chronic middle ear tuberculosis (tuberculous otitis) is a relatively rare, but severe form of tuberculosis infection, characterized by long-term consequences. It often occurs in combination with complicated forms of the general tuberculosis process, especially pulmonary tuberculosis. In such cases, patients have a weakened general immunity, prolonged intoxication and foci of inflammation, hematogenous or lymphogenous spread of tuberculosis bacteria to other organs and tissues.

Middle ear tuberculosis can manifest clinically with various symptoms: persistent or recurrent ear discharge, hearing loss, earache, and sometimes neurological symptoms such as facial nerve paralysis. In cases of chronic form, complete loss of the ear, bone tissue erosion, and intracranial complications may develop. This makes traditional treatment measures for such patients completely

ineffective. Although standard anti-tuberculosis treatment regimens (DOTS strategy) are currently used, complications arise in extrapulmonary forms of tuberculosis, in particular in ear foci due to drug-resistant strains or slow inflammatory and regenerative processes. Therefore, the need for additional or adjuvant therapy is increasing.

**Main part.** In recent years, interest in ozone therapy has increased. Ozone is a gaseous substance with strong oxidizing, bactericidal and immunomodulatory properties, which is used in medicine for local and systemic effects. It has the properties of reducing inflammation, accelerating tissue regeneration and improving microcirculation. At the same time, ozone therapy can increase the overall reactivity of the body in tuberculosis and enhance the effectiveness of basic treatments. In this study, the therapeutic efficacy and safety of ozone therapy are studied in patients with pulmonary tuberculosis and chronic middle ear tuberculosis. The goal is to determine the impact of ozone therapy on the healing process, its role in suppressing infection, and its importance in improving the overall condition of patients.

HTSU occurs with the involvement of the mucous membrane of the tympanic cavity and other formations related to the middle ear system. [2]. Despite scientific achievements aimed at diagnostics, treatment and prevention of ear tuberculosis (TU), the frequency of their occurrence does not decrease, constituting 3-5% among specific lesions of the ENT organs [1,3]. In 1% of all cases, tuberculous ear damage is primary, not combined with tuberculosis of other organs.

The main principle of conservative treatment of CTSU, as well as other focal infections, is a rational combination of general measures of influence on the body with local treatment. The former should be aimed at eliminating the general infection in CTSU and increasing the body's immunological strength. Local treatment consists of creating optimal conditions for elimination in the focus of inflammation, suppression of local infection and stimulation of reparative processes [4,7].

The effectiveness of the treatment of CTSU largely depends, along with systemic etiotropic therapy, on the local treatment used for introduction into the tympanic cavity (TC). Drug-resistant microflora is the cause not only of increased treatment periods, but also of a more severe course of diseases and the development of complications [2]. In this regard, it is necessary to study the effectiveness of new anti-tuberculosis drugs in the treatment of CTSU and to develop optimal methods for their use.

Taking into account the above, we found it interesting to study the effect of medical ozone (O<sub>3</sub>), ozone-containing drugs in the treatment of CTSU in combination with a solution of decasan. Ozone, regulating the course of protective reactions, reduces the destructive phase of inflammation and reduces the risk of formation of necrotic and ulcerative areas in the tympanic cavity, promotes the fusion of connective tissue around tuberculous nodules. However, there is no information on the most appropriate time of action of O<sub>3</sub> on various microbial factors, its effect on various populations of microbes depending on time, as well as in combination with anti-tuberculosis chemotherapy.

**Analysis and results.** We observed 20 patients with CTSU. Endoscopic examination revealed infiltration and swelling of the eardrum, its single or multiple defects and granulations. Our laboratory studies (cytology, bacterial culture, ELISA and PCR) showed that in most cases *Mycobacterium tuberculosis* was detected in patients with CTSU, and more often *M. Hominis* and *M. Bovis*. Depending on the treatment method, the patients were divided into two groups.

In the 1st group, 11 patients underwent deep ozonation of the middle ear using freshly prepared ozone containing a solution of decasan in combination with anti-tuberculosis drugs (rifampicin, isoniazid). The 2nd group was a control group and consisted of 9 patients who underwent traditional therapy, rinsing the ear with a solution of furacillin 1:5000 according to the standard treatment method.

For the treatment we used <<OZONATOR 0-1M>> (Metromed, Samarkand) which has a hole at the end. We used -0.002% Dekasan as the ozonized solution. The solution was bubbling for 5 minutes. During the five-minute bubbling, a solution containing ozone at a concentration of 600 µg/l was obtained. Only freshly prepared ozonized solution was used for the treatment. To introduce the medicinal substance into the middle ear cavity, we needed a disposable sterile syringe (5 ml for the treatment of otitis), a 4 cm long piece of plastic connecting tube from an intravenous infusion system and a movable obturating balloon with a non-return valve or an inflatable rubber cuff of any other design suitable for the lumen of the external auditory canal.

To perform the treatment, first, the end of the connecting tube is hermetically fixed in the external auditory canal with a movable occluding balloon. 5 ml of preheated ozonized solution is drawn into a sterile disposable syringe.

The next step is to insert the syringe into the free end of the connecting tube. Then, the syringe piston is pulled "towards you", which reduces the pressure in the external auditory canal. Air begins to flow into the auditory canal and the syringe, and the drug moves into the tympanic cavity. Complete administration of the drug is achieved by several return tractions of the piston.

During the treatment, patients of the first group underwent 7 procedures of deep ozonation of the middle ear cavities in a controlled baro mode. The procedure was performed daily for 5 minutes. Dosage 6 mcg / l per minute. One session at a concentration of 6 mcg / l. min. for 5 minutes. Is 30 mcg / l. The duration of treatment depended on the dynamics of the disease. The results of treatment were assessed based on the amount of washing, ozonation, endo-otoscopy and CT examination, as well as functional, laboratory and other studies. We recorded "recovery" in patients with the absence of subjective and objective symptoms of the disease, cessation of vision from the ear, persistent remission of the inflammatory reaction and stimulation of regeneration elements, normalization of functional and laboratory research.

"Improvement" we considered such a condition when the general well-being of patients normalized, headaches stopped, discharge from the ear decreased, hearing improved. The absence of significant changes in the course of the disease or the onset of a short-term improvement in the disease were assessed by us as "lack of effectiveness". There was no deterioration of the disease in any case. An important indicator of the effectiveness of the treatment of patients with CTSU is the number of BP lavages, transtymponal administration of drugs and the time of ozonation necessary to achieve a therapeutic effect.

The time of finding the tip and the number of lavages with subsequent ozonation of the ear in the 1st main group with CTSU were - respectively -  $2.8 \pm 0.8$ . In patients of the control group, the number of washes through the tip and the introduction of decamitoxin solution was  $5.0 \pm 0.58$  with HTSU. The disappearance of clinical manifestations of the disease with HTSU in patients of the main groups was observed after  $5.5 - 0.2$  and  $5.8 \pm 0.2$  days, and in the control group - after  $14.2 \pm 0.2$  days.

As for the effectiveness of treatment, normalization, as well as a significant improvement in hearing function corresponded to "clinical recovery and improvement". When conducting a traditional method of treatment, the temperature

in the ear increases slightly. After the end of the course of treatment, a decrease in local temperature was noted, which is confirmed by the abatement of inflammatory phenomena after the treatment. The laboratory studies revealed changes in the microbial landscape of the ear.

**Conclusion.** Thus, the results of treatment of patients with CTSU by ozonation method, testify to the effectiveness of this method. In connection with the wide use of ototoxic drugs for the treatment of tuberculosis, it is necessary to strengthen the monitoring of the hearing condition when prescribing aminoglycoside drugs. The use of ozonized solution of decasan contributes to the increase in the effectiveness of treatment of patients with CTSU.

Ozone therapy is an effective and safe method for treating chronic middle ear tuberculosis on the background of pulmonary tuberculosis. It can be recommended as a complement to the main antituberculosis therapy.

**List of references:**

1. Yakubovich, S. I. (2024). EVALUATION OF THE EFFECTIVENESS OF COMPLEX APPLICATION OF OZONE IN CHRONIC SUPPUROUS EAR DISEASES. *Central Asian Journal of Academic Research*, 2(11-2), 38-43.
2. Yakubovich, S. I., & Islomovna, S. J. (2024). TIBBIYOTDA FIZIKA FANINING O'RNII VA AXAMIYATI. *Science and innovation*, 3(Special Issue 29), 420-424.
3. Sabirova, M. M., Akhmedzhanov, I. A., & Shamatov, I. (1991). Successful removal of pharyngeal foreign body in a 3-month-old child after late diagnosis. *Vestnik Khirurgii Imeni II Grekova*, 146(2), 71-72.
4. SABIROVA, M., AKHMEDZHANOV, I., & SHAMATOV, I. (1991). SUCCESSFUL EXTRACTION OF A LATE DIAGNOSED FOREIGN-BODY FROM THE THROAT OF A 3-MONTH-OLD BABY. *VESTNIK KHIRURGII IMENI II GREKOVA*, 146(2), 71-72.
5. Мадаханов, А. С., Шаматов, И. Я., & Юнусова, Н. Б. ПОТРЕБНОСТИ СЕМЕЙ В КУРОРТНО-ОЗДОРОВИТЕЛЬНОЙ ПОМОЩИ И ИННОВАЦИОННЫЕ ПОДХОДЫ К ЕЁ УДОВЛЕТВОРЕНИЮ. *ЖАРЧЫСЫ*, 128.
6. Шаматов И.Я. Применение фонофареза новокаина при лечение хронического риносинусита «Профилактик тиббиетда юкри инновацион

- технологияларни куллаш» мавзусидаги республика илмий-амапrrppлий анжумани материаллари. 2020г –С.313
7. Shamatov, I., & Shopulotova, Z. (2023). ADVANNAGES OF PALATE LASER THERAPY IN COMPLEX TREATMENT OF LARINGITIS. *International Bulletin of Medical Sciences and Clinical Research*, 3(9), 104-107.
8. Shamatov, I. Y. (2023). Shopulotova ZA Nargiza Batirbekovna Abdukadirova Analysis of the effectiveness and errors of medical care. *Eurasian journal of research, development and innovation–2023*, 20(20), 1-4.
9. Ибрагимов, Ш. Р., Шаматов, И. Я., & Исламов, Ш. Э. (2020). Особенности повреждений челюстей. *Вопросы науки и образования*, (30 (114)), 36-44.
10. Shamatov, I. Y., Shopulotova, Z. A., & Abdukadirova, N. B. (2023). Comprehensive audiological studies sensory neural hearing loss of noise genesis. *American Journal Of Social Sciences And Humanity Research*, 3(10), 128-132.
11. Шаматов, И., Каримов, З., Шопулотова, З., & Махмудова, С. (2021). ВОЗМОЖНОСТИ КОМПЬЮТЕРНОЙ И МАГНИТНО-РЕЗОНАНСНОЙ ТОМОГРАФИИ В ВИЗУАЛИЗАЦИИ ПОЛОСТИ НОСА И ВЕРХНЕЧЕЛЮСТНОЙ ПАЗУХИ. *Журнал вестник врача*, 1(2), 113-115.
12. Шаматов, И. Я., Болтаев, А. И., Шадиёв, А. Э., & Кодиров, О. Н. (2017). Эндоскопическая диагностика и лечение деформации носовой перегородки и гипертрофии нижних носовых раковин. In *International Scientific and Practical Conference World science* (Vol. 5, No. 5, pp. 61-63). ROST.
13. Shamatov, I., & Shopulotova, Z. (2024). THE EFFECTIVENESS OF ULTRASOUND NON-PUNCTURE TECHNOLOGY WITH ENDONASAL INTRADERMAL ANTIBIOTIC THERAPY IN THE TREATMENT OF CHRONIC PURULENT POLYSINUSITIS. *Science and innovation*, 3(D4), 307-311.
14. Исламов, Ш. Э., Шаматов, И. Я., Шодиев, А. Э., & Шербеков, Б. Э. (2020). Дефекты оказания медицинской помощи в практике оториноларингологии. *Достижения науки и образования*, (4 (58)), 50-53.
15. Uralov, S., Shamatov, I., Shopulotova, Z., & Kodirova, M. (2024). IMMUNOLOGICAL INDICATORS IN STENOSING LARINGOTRACHEITIS IN CHILDREN. *Science and innovation*, 3(D1), 81-86.

16. Shamatov, I. Y., Shayqulov, H. S. H., & Shopulotova, Z. A. (2022). O'RTA QULOQNING ZAMBURUG'LI ZARARLANISHLARI. *Евразийский журнал медицинских и естественных наук*, 2(6), 425-427.
17. Шаматов, И., & Шопулотова, З. (2024). ИСТОРИЯ РАЗВИТИЯ ОТОЛАРИНГОЛОГИИ. *Евразийский журнал медицинских и естественных наук*, 4(5), 260-264.
18. Shamatov, I., Karabaev, H., Nasretdinova, M., & Nabiev, O. (2021). New in the vestibular rehabilitation of patients with dizziness. *Annals of the Romanian Society for Cell Biology*, 25(1), 99-103.
19. Шаматов, И. Я., Хушвакова, Н. Д., Шодиев, А. Э., & Курбанов, Э. Х. (2019). Комплексное лечение хронического риносинусита в стадии обострения. *Re-health journal*, (2), 5-10.
20. Yakubovich, S. I., Sharipovna, I. F., & Jurakulova, H. N. (2021). New Approaches in the Treatment of Odontogenic Sinusitis. *Cent. Asian J. Med. Nat. Sci*, 14, 57-60.
21. Шаматов, И., Курбанов, Э., Болтаев, А., & Соатмуратов, Х. (2015). Современные подходы к хирургической коррекции патологии устья слуховых труб у детей. *Стоматология*, 1(3 (61)), 91-93.
22. Насретдинова, М., Шаматов, И., & Коржавов, Ш. (2021). ЭФФЕКТИВНОСТЬ НЕКОТОРЫХ МЕТОДОВ ЛЕЧЕНИЯ БОЛНЫХ С ПОЛИПОЗНЫМ РИНОСИНУСИТОМ. *Журнал вестник врача*, 1(2), 71-74.
23. Шаматов, И. Я., Давронова, Г. Б., & Курбонов, Э. Х. (2016). Эндоскопическая диагностика: новые возможности щадящих хирургических операций в полости носа и глотки. In *Инновационные механизмы решения проблем научного развития* (pp. 186-189).
24. Yakubovich, S. I., Abdumuminovna, S. Z., Telmanovna, K. S., & Batyrbekovna, A. N. (2024). EVALUATION OF THE CLINICAL EFFECTIVENESS OF ANTIBIOTIC THERAPY IN COMBINATION WITH TOPICAL STEROIDS IN THE TREATMENT AND PREVENTION OF RECURRENT BACTERIAL SINUSITIS. *European International Journal of Multidisciplinary Research and Management Studies*, 4(03), 205-213.
25. Yakubovich, S. I., Mamataliev, A. R., Omonov, A. T., & Abdumuminovna, S. Z. (2023). HYPERTROPHIC RHINITIS IN CHILDREN: ENDOSCOPIC

- TREATMENT. *European International Journal of Multidisciplinary Research and Management Studies*, 3(02), 22-27.
26. Yakubovich, S. I. (2022). Morphofunctional Changes of the Adrenals at Chronic Exposure to Magnesium Chlorate. *Central Asian Journal of Medical and Natural Science*, 3(6), 178-185.
27. Хушвакова, Н. Ж., Исхакова, Ф. Ш., & Шаматов, И. Я. (2019). КОМПЛЕКСНОЕ ЛЕЧЕНИЕ ОСТРЫХ ЛАРИНГИТОВ. *Сборник научных статей по итогам работы Международного научного форума*, 98.
28. Yakubovich, S. I., & Abdumuminovna, S. Z. (2023). OTORHINOLARYNGOLOGY THROUGH THE EYES OF A FORENSIC EXPERT. *International Journal of Medical Sciences And Clinical Research*, 3(01), 29-32.
29. Шаматов, И. Я., Исламов, Ш. Э., & Шербеков, Б. Э. (2021). УСТАНОВЛЕНИЕ ДАВНОСТИ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМЫ. *Вопросы науки и образования*, (13 (138)), 34-38.
30. Шаматов, И. Я., & Шопулотова, З. К. (2024). ОСОБЕННОСТИ ДИФФЕРЕНЦИАЛЬНОЙ ДИАГНОСТИКИ И ЛЕЧЕНИЕ ПАРАДОКСАЛЬНОГО ДВИЖЕНИЯ ГОЛОСОВЫХ СКЛАДОК У ЖЕНЩИН. *Eurasian Journal of Medical and Natural Sciences*, 5(1), 45-49.
31. Shamатов, I., & VA, S. Z. O. U. K. (2023). MAGNIT-REZONANS TOMOGRAFIYANING DIAGNOSTIK IMKONIYATLARI. *Евразийский журнал академических исследований*, 3, 2.
32. Yakubovich, S. I. (2022). Asliddinovich SS SPECIFIC DIAGNOSIS OF CHRONIC TONSILLITIS. *ResearchJet Journal of Analysis and Inventions*, 3(06), 202-204.
33. Хушвакова, Н., Шаматов, И., Хамракулова, Н., & Усманов, Ш. (2018). Роль озонотерапии в лечении экссудативных гайморитов. *Журнал проблемы биологии и медицины*, (1 (99)), 124-126.
34. Исламов, Ш. Э., & Шаматов, И. Я. (2005). Судебно-медицинские аспекты дефектов медицинской помощи в оториноларингологической практике. *Российская ринология*, (2), 144-145.
35. Eryigitovich, I. S., Yakubovich, S. I., Negmatullaevna, M. N., & Rustamovna, M. S. (2023). Histochemical Indicators of The Adrenal Gland Under Acute Exposure to Magnesium Chlorate. *Journal of Advanced Zoology*, 44.

36. ШАМАТОВ, И., БОЛТАЕВ, А., & ШОПУЛОТОВА, З. (2023). КОМПЛЕКСНОЕ ПРИМЕНЕНИЕ МЕТОДОВ РЕГИОНАРНОЙ АНТИБИОТЕРАПИИ И ФИЗИОТЕРАПИИ ПРИ ОДОНТОГЕННОМ ВОСПАЛЕНИИ ПОЛОСТИ ВЕРХНЕЧЕЛЮСТНОЙ ПАЗУХИ. *International Bulletin of Medical Sciences and Clinical Research*, 3(3), 29-33.
37. Шаматов, И., Коржавов, Ш., & Курбанова, Л. (2021). Эффективность некоторых методов лечения пациентов с полипозным риносинуситом. *Журнал биомедицины и практики*, 1(3/2), 159-164.
38. Шаматов, И. Я., Исламов, Ш. Э., & Шербек, Б. Э. (2021). УСТАНОВЛЕНИЕ ДАВНОСТИ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМЫ. *Вопросы науки и образования*, (13 (138)), 34-38.
39. Шаматов, И. Я., & Исхакова, Ф. Ш. (2016). РОЛЬ АУДИОМЕТРИИ В ДИАГНОСТИКЕ СЕНСОНЕВРАЛЬНОЙ ТУГОУХОСТИ. *ББК 65.26 Н 72*, 54.
40. Бахронов, А. Р., Хушвакова, Н. Ж., Болтаев, А. И., & Шаматов, И. Я. (2014). Применение комбинированных антисептиков в лечении острого фарингита. *Вестник Казахского Национального медицинского университета*, (2-3), 14-15.
41. Шаматов, И. Я., Болтаев, А. И., & Расулова, М. Р. (2022). ИММУНОБИОХИМИЧЕСКИЕ СДВИГИ ПРИ СЕЗОННОЙ БИЦИЛЛИНОМЕДИКОМЕНТОЗНОЙ ПРОФИЛАКТИКЕ ХРОНИЧЕСКИХ ТОНЗИЛЛИТОВ В САНАТОРНЫХ УСЛОВИЯХ. In *Проблемы постковидной оториноларингологии* (pp. 284-286).
42. Шодиев, С., Шаркиев, А., Аббосов, О., Фозилова, Д., & Шаматов, И. (2016). Усовершенствование лечения альвеолитов лунок зубов. *Стоматология*, 1(2-3 (63-64)), 54-57.
43. Sabirova, M. M., Akhmedzhanov, I. A., & Shamatov, I. (1991). Errors in the diagnosis of a foreign body in the pharynx of a three-month old child. *Vestnik Otorinolaringologii*, (4), 60-60.
44. Sabirova, M. M., Rustamova, B. A., & Shamatov, I. (1991). Unusual cases of esophageal foreign bodies. *Vestnik Otorinolaringologii*, (2), 78-78.
45. Насретдинова, М. Т., Шаматов, И. Я., & Коржавов, Ш. О. ПОЛИПОЗ РИНОСИНУСИТ БИЛАН ОФРИГАН БЕМОРЛАРДА АЙРИМ ДАВО УСУЛЛАРИНИНГ САМАРАДОРЛИГИ. *ДОКТОР АХБОРОТНОМАСИ ВЕСТНИК ВРАЧА DOCTOR'S HERALD*, 70.

46. Khushvakova, N., Shamatov, I., Esanov, A., Khojiev, A., & Gaybullaev, R. (2025). CHRONIC POLYPOUS RHINOSINUSITIS AND MODERN TREATMENT OF POLYPS IN THE NOSE. *Естественные науки в современном мире: теоретические и практические исследования*, 4(2), 43-47.
47. Boliev, I., Mukhammadieva, M., & Shamatov, I. (2025). NASAL AND THROAT DISEASES IN CHILDREN, THEIR PREVALENCE, PREVENTION AND THE IMPORTANCE OF FAMILY REHABILITATION. *Журнал академических исследований нового Узбекистана*, 2(1), 173-178.



Research Science and  
Innovation House

