



## Results of One of the Tympanoplasty Methods and their Implementation in Residents' Training

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### Abstract

*The scientific article is devoted to strategic ways of developing the human resources potential of higher education, in particular, Innovations in Health Care Education in the Republic of Uzbekistan. The teacher plays an important role in the practical education of young specialists. In this article, a resident teacher is involved in the practical process. The quality of health care is increasingly dependent on human potential, especially the teacher. Their knowledge and skills in planning, organizing, directing and controlling practical skills are a key factors in the effectiveness of health care. The purpose of this work is to perform tympanoplasty in patients with chronic perforated otitis media, as well as to implement the results obtained in the learning process. In order to train competent specialists who are ready to independently form the practical thinking of professional development into training, it was necessary to introduce the task of restoring the air anatomical and physiological function of the middle ear using various types of autografts and use this practice as a theory in teaching residents to improve their skills in treating patients with chronic perforated otitis media. Using the results of tympanoplasty of 204 patients aged 10 to 50 years with chronic perforative otitis media, who were hospitalized in the ENT department of the TashPMI clinic, before and after type I-III tympanoplasty, an analysis were carried out using the data obtained, used during the training period. The anatomical efficiency of type I-III tympanoplasty in patients of group I by the endaural approach after surgery reached 94%, in group II 91% and in group III 85%. The results obtained indicate that the widespread use of an autograft (perichondrium with cartilage) in type I-III tympanoplasty will improve the quality of surgical indicators, which will allow residents to increase their knowledge and skills based on existing experience and improve the system of Health Care Education in the formation of competencies of future university graduates.*

**Keywords:** *advanced training, Health Care Education, chronic perforated otitis media, autograft, tympanoplasty.*

**Introduction:** Until now, one of the causes of progressive conductive hearing loss and intracranial complications was chronic otitis media (COM). The issues of treatment of COM have never lost its relevance for otorhinolaryngologists, since it has become the main cause of acquired hearing loss and is more often affected by working age population [7,9,12,14,27,29,32].

One of the main points of tympanoplasty, or even the main goal, remains the creation of a tympanic cavity and the restoration of the tympanic membrane. Reconstruction of the tympanic cavity in COM continues to occupy a specific weight among doctors engaged in ear surgery. There are various types of autografts to close defects in the tympanic membrane. The discussion about the benefits of this or that autograft is still open. As a plastic material, otosurgeons use various autografts: perichondrium, cartilage, fascia of the temporal muscle, vein wall, autografts in two combinations, etc. In the technique of performing tympanoplasty, despite the general fundamental principles, there are controversial issues regarding the choice of plastic material and the method of its placement, the method of tamponade, postoperative management, etc. As for the choice of plastic material for tympanoplasty, the validity of the use and the greatest efficiency of auto tissue is beyond doubt. The perichondrium, cartilage, fascia, periosteum, etc. are most often used for tympanoplasty. Various otosurgical schools, based on their experience, substantiate and recommend the use of one or another autologous material [1-5,8,10-13,17,18,20,21,23,29-31,33,35,36]. The choice of plastic material is determined by the size and location of the perforation. In our studies, for the repair of tympanic membrane perforations, the perichondrium with cartilage, the perichondrium from the tragus, and the fascia of the temporal muscle were used.

Until today, various methods of placing grafts are distinguished, which still cause controversy among otosurgeons. Overlay and underlay methods of myringoplasty are distinguished depending on the placement of the graft (cartilage, fascia and other autografts and implants) above the own (fibrous) layer of the tympanic membrane, after its de-epidermisation or under it [6,14-16,19,22,24-26,28,34]. Due to the fact that our patients were dominated by patients with subtotal perforation, we undertook to use the underlay method.

**The aim of this study was:** restore the air anatomical and physiological function of the middle ear using various types of autografts and use of existing results in the form of video materials and clinical developments in the practice of training residents to improve their skills in the treatment of patients with chronic otitis media (COM).

**Material and research methods.** Modern medicine is based on improvements of the quality of practical skills in the study of residents to the basics of practical skills. The work is based on the long-term results of clinical observation and treatment of 204 patients (246 ears) with COM after surgical treatment. The patients' age ranged from 10 to 50 years. All examined patients are used as an example in the study of practical experience. When distributing patients by gender, we did not reveal any significant differences. The average age of the patients was  $39.3 \pm 1.47$  years. The duration of the disease ranged from a year to 5 years - in 24 patients (11.7%), from 6 to 10 years in 73 patients (35.8%) and more than 11 years - in 107 patients (52.5%), while the recurrence rate of the chronic process in 142 patients (69%) was observed from 1 to 4 times a year. When examining the auditory tubes before the operation, there was a violation of the ventilation and drainage functions of the II-III degree in almost all patients.

In our observations, patients were admitted to inpatient treatment with complaints of hearing loss and periodic relapse of the underlying disease. Based on the results of the study, it was revealed that one of the reasons for the recurrence of COM is ascending infection through the auditory tube, and the supporting factor is rhino-epipharyngeal pathology. As a result of clinical examination, the patients revealed concomitant diseases, such as adenoid vegetation in 32 patients (15.7%), chronic diseases of the nose and paranasal sinuses in patients 28 (13.7%), deviated nasal septum in 26 patients (12.7%). In this regard, to eliminate pathology in the upper respiratory tract, chronic rhinitis was treated in 11 patients (5.4%), chronic diseases of the paranasal sinuses in 17 patients (8.4%), surgical treatment - septoplasty in 26 patients (12.7%) and adenotomy in 32 patients (15.7%).

In dynamic observations, the relative sizes of the tympanic membrane perforations, determined in patients by age, were revealed. Of the total number of patients, patients with subtotal perforation of the tympanic membrane prevailed - 147 (59.8%), total perforation was revealed - in 77 (31.3%) and a small one within one square (2 ml) - in 22 (8.9 %). During type I-III tympanoplasty, grafts were used taking into account their implantation characteristics. The perichondrium with cartilage was used in 87 cases (35.4%), the perichondrium - in 78 (31.7%), and the superficial fascia of the temporal muscle - in 81 cases (32.9%). Surgical manipulations were performed jointly with residents. The operation was performed under a microscope with Sol anesthesia. Ultracaini 1:100,000, preliminary de-epidermis of the edges of perforation, after lunar incision, separation of the skin of the external auditory canal. The remnants of the tympanic membrane are exposed from the process of the handle of the malleus. The mobility of the ossicular chain was checked with revision of the tympanic cavity with the removal of pathological adhesions and scars from it, mobilization of the ossicular chain, and, if necessary, ossiculoplasty with cartilaginous autograft. The overhanging lateral attic wall was knocked down with a chisel or smoothed with a bone spoon. During hemostasis, cotton balls with 0.1% adrenaline solution were used. Under local anesthesia, a lunar incision was made along the inner wall of the tragus, the cartilage was excised together with the perichondrium, and the cartilage base was thinned to 0.3 mm using a cutter. The autograft was laid on the inner side of the tympanic membrane, while the cartilaginous base lay on the handle of the malleus and the tympanic membrane was placed on top. The peculiarity of the essential moment of the operation is that the cartilaginous base with the shortened handle of the malleus is a "continuation" of the handle, while the perichondrium is straightened along the inner surface of the tympanic membrane with the. With perforations up to 1/3 of the area of the tympanic membrane, the dimensions of the excess of the area of the perichondrium with cartilage are the same as in the first option, but its area in diameter is always slightly larger than that required to close the perforation of the tympanic membrane by approximately 0.5–1.0 mm more in the entire perimeter. Technically, they start it in the same way, from the side of the external auditory canal. After installing the cartilaginous part of the graft, the perichondrium is straightened on the previously de-epidermal surface of the tympanic membrane and, with possible additional adaptation, the previously created epidermal flaps are placed on the edges of the autograft. In cases of subtotal and total defects of the tympanic membrane, the excess of the

cartilage area is very insignificant - only to ensure the state of its expansion after installation in the tympanic ring with some bend towards the tympanic cavity, while the cartilage is removed together with the perichondrium, then the perichondrium is straightened, but strictly along the walls the external auditory canal, while the most difficult in the technical aspect is the fixation of the graft in the anterior sections of the tympanic ring. To prevent the falling of the tympanic flap into the tympanic cavity and its fusion with the medial wall, we used the method of filling the tympanic cavity with an absorbable sponge (Multi Gel) impregnated with an antibiotic (Ceftriaxone). For this, the absorbent sponge was cut into pieces of various sizes from 0.2x0.2 cm to 1.0 cm<sup>2</sup>, impregnated with a solution of ceftriaxone and during the operation filled the edges of the tympanic cavity with them. The used absorbent sponge served as a framework for the nontympanic membrane, was absorbed within 10–15 days, and served as a fixator for the autograft. The two-layer graft also served as a scaffold against retraction into the promontorial cavity. In addition to the above points, the advantage of this method is that the surrounding tissues are reliably provided with blood supply, thereby excluding the "disease" of the graft. After laying nontympanic and epidermal flaps, the top was also laid out along the edges with an absorbent sponge, with tamponade of the external auditory canal with a cotton ball.

Treatment of patients with COM in the postoperative period consisted of general and local measures.

The general event included the appointment of cephalosporin antibacterial drugs (cefotaxime, ceftriaxone) at a dosage of 1.0 g per day for 6 days, then they switched to their tablet forms for 3-4 days, taking into account the inflammatory local reaction of the body. In addition, with increased trans and exudation, antihistamines (zodak, lorotal) were prescribed, if necessary, 10% calcium chloride in dilutions in 100 ml of 0.9% isotonic solution to increase the body's anti-inflammatory response and reduce vascular permeability. Of the local measures in the postoperative period, particular importance was attached to methods to improve or restore the drainage and ventilation functions of the auditory tube.

Surgery on the middle ear causes dysfunction of the Eustachian tube on the side of the operation for up to two weeks, impairing its function. With this in mind, all patients were prescribed a nasal spray (nasivin, oxyphrin) at an age-specific dosage. To improve tissue microcirculation, drugs were prescribed in an age-specific dosage (trental, piracetam, etc.).

**Results and Discussions:** During the scientific research, it was revealed that patients with chronic otitis media had a concomitant rhinogenic pathology that required preliminary sanitation of the nose, paranasal sinuses and nasopharynx. As we know, the modern complex requirement for the treatment of patients with perforated otitis media is the normal functioning of the auditory tube, and therefore it is advisable to eliminate pathological conditions in the nasal cavity, paranasal sinuses and nasopharynx. In turn, for the normal functioning of the auditory tube, a whole and functionally active tympanic membrane is required, which draws air into the tympanic cavity like a piston. In this regard, the effectiveness of tympanoplasty is associated with the effectiveness of the functional state of the auditory tube at all stages of surgery.

Analysis of the research results made it possible to identify the features of the interventions that affect the adaptation process of heterogeneous grafts. The anatomical efficiency of type I-III tympanoplasty in patients of group I using the endaural approach after surgery reached 94%, in group II - 91% and in group III - 85%.

In the course of the results of the follow-up analysis of the work performed, in patients of group I during audiological testing, an improvement in auditory function was revealed by  $17.2 \pm 1.52$  dB, in patients of group II by  $14.3 \pm 1.54$  dB, in patients of group III by  $8.5 \pm 1.47$  dB. At the same time, the results of the analysis of the work performed showed that there was no improvement in auditory function in 4 patients (4.5%) of group I, in patients 5 (16.1%) of group II, in 7 patients (8, 9%) of group III. Moreover, secondary perforation of the tympanic membrane after reoperation was not observed in patients, and no significant differences were found in studies of the auditory function.

Considering that in our studies, patients with subtotal and total defects of the tympanic membrane with changes in the mucous membrane of the tympanic cavity prevailed, for tympanoplasty we took into account the histological parameters of the perichondrium with cartilage, which consists of collagen fibers and it is more "thick and elastic" and reliably serves for the prevention of retraction pockets and re-perforations.

Analysis of the results of clinical and audiological studies showed that the use of perichondrium with cartilage serves as an autologous material to improve the transmission of sound vibrations along the structures of the middle ear and as a reliable material for restoring the integrity of the tympanic membrane.

When studying the anamnesis of patients after tympanoplasty, it was revealed that in order to obtain a lasting effect in hearing-improving operations, it is necessary to take into account the age factor, the size of the perforation, the patency of the auditory tube, the condition of the mucous membrane of the tympanic cavity, the duration of the chronic process, the period since the last relapse of the underlying disease, its competent treatment, the chosen method of operation, the experience of the surgeon and postoperative care, as well as an important role in the postoperative period are preventive measures to combat acute diseases of the upper respiratory tract and dysfunctions of the nasal cavity and nasopharynx.

**Conclusion:** All examined patients underwent tympanoplasty with the endaural approach on the "dry ear", since this not only reduces the volume of the operation, but also provides good reparative capacity of tissues after the operation and reduces the risk of recurrence of the process. The use of a perichondrium with a cartilaginous base prevents retraction and sinking of the created structure and does not affect its acoustic properties.

Studying the research results, we can say that two-layer autografts (perichondrium with cartilage), was the most resistant and more "elastic" material, replacing the tympanic membrane.

The choice of the operation technique depends on the form of COM, the degree of prevalence and severity of the pathological process, the anatomical features of the structure of the mastoid process, the degree of auditory disorders, the state of the auditory tube, and the presence of complications.

### Results:

1. The method used with an autograft of the perichondrium with cartilage, improves acoustic properties and is a small-volume surgical intervention with a low percentage of complications and serves to improve the patient's social communication.

2. To increase the efficiency of tympanoplasty in patients with COM, early surgical intervention, the use of a multilayer autograft and observation in the dynamics of the operating otosurgeon are necessary.

### References.

1. Ageenko A.I. Treatment of perforated purulent otitis with the introduction of drugs // *Ros. otorhinolaryngology* 2004; 1: 8: 24-25.
2. Vishnyakov V.V., Piskunov G.Z. Reconstructive microsurgery of the middle ear in chronic suppurative otitis media. Textbook. M 2004; 40.
3. Dvoryanchikov V. V., Kochergin G. A., Syroezhin F. A. Modern possibilities of fixation of multilayer grafts in myringoplasty // *Vestn. otorinolar.* – 2012. – № 4. – С. 51–53.
4. Dubinets I. D., Kurenkov E. L., Kofanov R. V. Influence of the nature of morphological changes in the mucous membrane of the middle ear on the course of reparative processes in the neotympanic membrane during reconstructive sanitizing surgery in a patient with chronic otitis media // *Vestn. Otorhinolaryngitis* – 2007. – № 5; 11–13.
5. Zavyalov F. N., Kosyakov S. Ya., Goncharova O. G. The results of the use of biologically enriched plasma with platelets in piston stapedoplasty and myringoplasty // *Ros. Otorhinolaryngitis* – 2011. – № 3 (52); 53–58.
6. Zagainova N.S., Brodovskaya O.B. On the surgical treatment of chronic suppurative otitis media // *Russian otorhinolaryngology*. 2008. – App. 2; 247-249.
7. Karneeva O.V. Surgical rehabilitation of children with chronic inflammatory pathology of the middle ear // Abstract of the thesis. diss. doc. honey. Sciences. M., 2012; 41.
8. Kosyakov S. Ya., Pakhilina E. V. Long-term results after tympanoplasty // *Ros. otorhinolaryngitis* - 2008. - No. 2. - App. - P. 269–272.
9. Kosyakov S.Ya. Selected issues of practical otosurgery. // M.: MTsFER, 2012; 224.
10. Kofanov R.V., Rostovtsev V.N. Topical issues of practical and theoretical medicine / To the 50th anniversary of the clinic of the Chelyabinsk State Medical Academy. Chelyabinsk 1997; 123-124.
11. Kryukov A.I. et al. Morbidity rates and the quality of outpatient ENT care for patients with ear and upper respiratory tract pathology in the city of Moscow // *Proceedings of VII scientific-practical conference "Pharmacological and physical methods of treatment in otorhinolaryngology"*. – M., 2008; 10-13.
12. Mukhitdinov U.B. Comparative aspects of autografts in tympanoplasty in patients with chronic suppurative otitis media and its computed tomographic diagnosis // *Central Asian Journal of Pediatrics* 1 (1) 2019; 223-228.
13. Palchun V.T. Reliability and reliability of scientific information in otorhinolaryngology // *Proceedings of the IV All-Russian Annual Conference*. M. 2005; 14-18.

14. Aidonis I. A. Cartilage shield tympanoplasty: a reliable technique / Aidonis I., Robertson T.C., Sismanis A. // *Otology & Neurotology*. – 2005. – Vol. 26, № 5. – P.838-841.
15. Altuna X. [et al.]. Island cartilage myringoplasty. Anatomical and functional results in 122 cases. // *Acta Otorrinolaringol. Esp.* – 2010. – Vol. 61, № 2. – P. 100 – 105.
16. Cavaliere M. [et al.]. Tragal cartilage in tympanoplasty: anatomic and functional results in 306 cases. // *Acta Otorhinolaryngologica Italica*. – 2009. – Vol. 29, № 1. – P. 27.
17. Demirpehlivan I.A. [et al.] Comparison of different tympanic membrane reconstruction techniques in type I tympanoplasty // *Europ. Arch. of Oto-Rhino-Laryngology*. – 2011. – Vol. 268, № 3. – P. 471474.
18. Gupta N. Tympanoplasty in children / N. Gupta, R. K. Mishra // *Indian J. of Otolaryngology and Head and Neck Surgery*. – 2002. – Vol. 54, № 4. – P. 271–273.
19. Gierek T. [et al.]. Results of myringoplasty and type I tympanoplasty with the use of fascia, cartilage and perichondrium grafts // *Otolaryngologia Polska*. 2004. Vol. 58. P. 529–533.
20. Harkare V.V. [et al.] A Comparative Study of Different Tissues Used For Tympanic Membrane Grafting // *J. Evol. Med. Dent. Sci*. 2013. Vol. 2, № 41. P.4834–4840.
21. Ikeda M. et al. Canal wall down tympanoplasty with canal reconstruction for middle-ear cholesteatoma: post-operative hearing, cholesteatoma recurrence, and status of re-aeration of reconstructed middle-ear cavity // *J. Laryngology & Otology*, 2003; 117 (4): 249-255.
22. Kazikdas K.C. [et al.]. Palisade cartilage tympanoplasty for management of subtotal perforations: a comparison with the temporalis fascia technique // *Europ. Arch. of oto-rhino-laryngology*. – 2007. – Vol. 264, № 9. – P. 985–989.
23. Mills R. Results of myringoplasty operations in active and inactive ears in adults / R. Mills, G. Thiel, N. Mills // *Laryngoscope*. 2013. Vol. 123, № 9. P. 2245– 2249.
24. Mohamad S.H. Is cartilage tympanoplasty more effective than fascia tympanoplasty? A systematic review / Mohamad S.H., Khan I., Hussain S.M. // *Otology & Neurotology*. – 2012. – Vol. 33, № 5. – P. 699–705.
25. Mokbel K. Repair of subtotal tympanic membrane perforation by ultrathin cartilage shield: evaluation of take rate and hearing result / K.M. Mokbel, E.S.Thabet // *Europ. Arch. of Oto-Rhino-Laryngology*. – 2013. – Vol. 270, № 1. – P. 33–36.
26. Mundra R.K. Tympanoplasty in Subtotal Perforation with Graft Supported by a Slice of Cartilage: A Study with Near 100% Results / Mundra R.K., Sinha R., Agrawal R. // *Indian J. of Otolaryngology and Head & Neck Surgery*. – 2013. – Vol. 65, № 3. – P. 631–635.
27. Mishiro Y. et al. Tympanoplasty with and without mastoidectomy for non-cholesteatomatous chronic otitis media // *Eur. Arch. Otorhinolaryngol.*, 2001; 258: 13-15.
28. Mrbe D. [et al.] Acoustic properties of different cartilage reconstruction techniques of the tympanic membrane // *The Laryngoscope*. – 2002. – Vol. 112, № 10. – P. 1769-1776.
29. Mukhitdinov U.B., et al. The analysis of clinical outcomes of hospital patients with chronic otitis media // *International medical scientific journal*, 2016; № 2 (8): 59-62.
30. Pannu K.K. [et al.]. Evaluation of hearing loss in tympanic membrane perforation // *Indian J. of Otolaryngology and Head & Neck Surgery*. – 2011. – Vol. 63, № 3. – P. 208-213.
31. Patil K. [et al.]. Evaluation of different graft material in type I tympanoplasty / Patil K., Baisakhiya N., Deshmukh P.T. // *Indian J. of Otology*. 2014. Vol 20, № 3. P. 106– 114.
32. Qureishi A. et al. Update on otitis media – prevention and treatment / *Infect Drug Resist*, 2014; 7: 15-24.
33. Sasaki T. et al. Results of hearing tests after total middle ear reconstruction // *Acta Otolaryngologica*, 2007; 127 (5): 474–479.
34. Type I tympanoplasty with island chondro-perichondral tragal graft: the preferred technique? / E. de Seta [et al.] // *J. Laryngol Otol*. 2013. Vol. 127(4). P. 354–358.
35. Vadiya S.I. [et al.]. Technique and results of cartilage shield tympanoplasty // *Indian J. of Otology*. – 2014. – Vol. 20, № 4. – P. 196–198.
36. Yuon A. [et al.]. Myringoplasty: Impact of Size and Site of Perforation on the Success Rate // *Indian J. of Otolaryngology and Head & Neck Surgery*. – 2015. Vol. 67, № 6. P. 185–189.