

The Role of Microscopic Techniques in Performing Tympanoplasty in Children

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Abstract

Introduction

Tympanoplasty is a delicate microsurgery, surgery repairing an anatomical lesion of the middle ear, caused by suppuration of chronic otitis.

Objectives

The main direction of the study is to determine the efficacy of tympanoplasty under microscopic control preoperatively, during surgery and postoperatively. ListenRead phonetically

Materials and methods

In the clinic of pediatric otorhinolaryngology, 220 tympanoplasties were performed in children aged 8 to 18 years in the period 1995 – 2010. For examining the affected ear was used the surgical microscope "Opton". During surgery it was used the retroauricular access, given the narrow ear canal and need to perform control antrotomy in children. The temporal fascia, previously taken above the operated ear, was used as a graft. The fibrous ring of the tympanum perforation edge was removed and the skin of the posterior wall of the external auditory canal with the tympanum ring and the posterior part of the tympanum were taken off. During operation, after a detailed microscopic examination of middle ear, it was planned the type of tympanoplasty. As support for the fascial graft was used the gelfoam applied in the middle ear. It was used the surgical technique "Underlay" or „Overlay".

Results

Positive results after tympanoplasty using surgical microscope, characterized by integral neo tympanum, lack of exacerbations of the inflammatory process of the middle ear, were obtained in 83% of operated children, including 45% cases with the improvement of hearing.

Conclusion

Microscopic control of the affected ear before, during and after surgery improves clearly the quality of microsurgical intervention, reduces the number of ear complications, improves hearing in children and reduces their invalidity.

I. INTRODUCTION

Otorhinolaryngology is continuously developing from one decade to another, as a result of technical progress (microscopes, optical endoscopes, laser) and microsurgical instruments, by constant improvement of means of investigation and treatment.

Classical Otolaryngology has changed substantially in recent decades by finding and describing new otic diseases, by the appearance of new operative techniques aimed at a functional and reconstructive surgery of the middle ear [3].

Hearing is crucial for child's development. It assures one of the main needs - verbal communication.

Tympanic membrane is one of the elements of the transformer, impedance adapter and reducing loss of sound energy system of the myringo-ossicular system, contributing through its surface to the hydraulic transformation (myringo-platinary) and serves to protect the cavum tympani region [2; 4].

Myringoplasty has two main goals: sound protection of the round window and restoring the surface and the tension of the tympanic membrane using a graft.

Tympanoplasty is a delicate microsurgery, surgery repairing an anatomical lesion of the middle ear, caused by suppuration of chronic otitis. This functional surgery aims to achieve an improvement in hearing. Tympanoplasty requires a spirit of analysis, being not a standard operation [5].

Myringoplasty and tympanoplasty are descriptive terms defining surgical procedures that address pathology of the tympanic membrane and middle ear. Myringoplasty is an operative procedure used in the reconstruction of a

perforation of the tympanic membrane. This assumes that the middle ear space, its mucosa, and the ossicular chain are free of active infection. There is no direct inspection of the middle ear during this procedure. Tympanoplasty implies reconstruction of the tympanic membrane but also deals with pathology within the middle ear cleft, such as chronic infection, cholesteatoma, or an ossicular chain problem.

Before deciding to undertake a tympanoplasty, a rigorous testing should be carried out to detect and eliminate any existing problems (adenoids, nasal septum deviation, pharyngitis, rhino-sinusitis etc.); general testing will detect the general diseases of the patient [1, 6].

Indications for tympanoplasty:

-permeable auditory tube (controlled by artificial eardrum tolerance test, by tubal blowing or even impedancemetry);

-disabling traumatic or post-otitic "dry" perforations;

- appropriate vascular bed - for nutrition of the graft.

Contraindications to tympanoplasty are divided into two major groups:

1. Absolute contraindications (unconditioned):

a) complete hearing loss;

b) mixed hearing loss with the prevailing of the perception type;

c) completely blocked auditory tube, if tube permeability can not be restored;

2. Conditioned contraindications:

a) intracranial complications;

b) reheated chronic suppurative otitis media;

- c) eczema and dermatitis of the ear canal and auricular region;
- d) extended decay of the tympanic box walls;
- e) reduced permeability of auditory tube;
- f) various nasal conditions, nasopharyngitis, and various general diseases such as tuberculosis in the active stage, syphilis, infectious contagious diseases, etc. [3].

Conditions necessary for sound transmission after tympanoplasty:

1. Permeable auditory tube (controlled by artificial eardrum tolerance test, by tubal blowing or even impedancemetria), for ventilation and drainage;
2. Closing the perforation of the eardrum or the space with neotympanum;
3. Restoring the sound transmission path from the neotympani to perilymph (columelar effect);
4. The two windows should be free on both sides of the membranous labyrinth.

The rate of success of pediatric tympanoplasty is likely not a matter of age, but a matter of patient selection. Careful attention to factors such as technique, eustachian-tube function, and site and size of the perforation will likely increase the rate of an intact tympanic membrane with improvement in hearing. No one variable determines outcome. Clearly, some factors studied are age-related, but age in itself should not be an indication or contraindication to treatment. The overall success rate of tympanoplasty, with or without mastoidectomy, in the treatment of chronic pediatric otitis media, was high and did not depend on patient age, the status of the contralateral ear, the inclusion or absence of surgical mastoidectomy, or the method of mastoidectomy (when this procedure was employed). Tympanoplasty may be expected to improve hearing in cases of chronic otitis media accompanied by perforation, but not in cases of cholesteatoma.

II. OBJECTIVES

The main direction of the study is to determine the efficacy of tympanoplasty under microscopic control preoperatively, during surgery and postoperatively. Materials and methods

In the clinic of pediatric otorhinolaryngology, 220 tympanoplasties were performed in children aged 8 to 18 years in the period 1995 – 2010. Surgeries were performed under general anesthesia and the control of the microscope "Opton".

Preoperatively, the patient is examined in the dressing room, using a microscope. The ear canal and eardrums of the child is examined, place of perforation of the affected ear is evaluated, pathological eliminations are excluded and the final diagnosis is established, chronic epitympanitis or mesotympanitis in remission. During surgery (tympanoplasty) surgical microscope is used for more detailed examination of the middle ear, the mobility of ossicular chain is evaluated (hammer, anvil, stirrup) and if possible, mobility of the oval window. Following these examinations, the type of tympanoplasty is planned during surgery.

Detailed microscopic examination of the neotympanum is also carried out after surgery, after removing the tampons of the ear canal. Postoperative complications are excluded, the vascularization of the neotympanum is evaluated.

During the surgery the retroauricular way was used, taking into account the narrow auditory canal in children and

need to perform the control antrotomy. As a graft the temporal fascia taken above the operated ear or tragus perichondrium were used.

For convenience during surgery, a dual instrument table was elaborated. On the inferior part is placed the patient's head, on superior one - the microsurgical instruments needed. Another device developed by us, is the one for mounting ear speculum, which consists of a fixing mechanism to the surgical table, a telescopic arm and an ear speculation mounting mechanism. This device practically assures the surgeon's bimanual work.

At the beginning of surgery, firstly the ear canal is cleaned by careful aspiration. The fibrous ring of the eardrum perforation edge is removed and the skin of the posterior wall of the external auditory canal with eardrums ring is taken off. When the front edge of the perforation or at least the tympanic ring was present, it was used the Underlay technique - fascia placed under the flap.

Graft over the remains of the eardrum (the technique of "Overlay") was applied when the anterior fibrous ring or perforation anterior edge was missing. As support for the fascial graft was used the gelfoam applied in the middle ear. The gelfoam sponges soaked with Sol. Hydrocortizoni were applied on fascia followed by tampons soaked with antibiotic ointment. After 8 - 10 days, all the tampons are removed from the ear canal and antibiotic ointment is applied locally.

III. CONCLUSION

Positive results after tympanoplasty using surgical microscope, characterized by integral neo-tympanum, lack of exacerbations of the inflammatory process of the inner ear were obtained in 83% of children operated on, 45% of cases being with improvement of hearing. Microscopic control of affected ear before, during and after surgery, improves clearly the quality of microsurgical intervention, reduces the number of ear complications, improves hearing in children and reduces their invalidity

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