

# *Timanoplastia Myringoplasty Type 1 and in Residency Surgical Results and Audiometric*

## *Timanoplastia Tipo 1 e Miringoplastia na Residência - Resultados Cirúrgicos e Audiométricos*

*Edgar Sirena\*, Bettina Carvalho\*, Mauricio Buschle\*\*, Marcos Mocellin\*\*\*.*

\* Graduation in Medicine. Medical (a) Resident of Otolaryngology at the HC / UFPR.

\*\* Master of Medicine (Surgery) at the Federal University of Parana, Brazil (1999). Adjunct Professor of Otorhinolaryngology UFPR - Federal University of Parana, Brazil.

\*\*\* Ph.D. in Otorhinolaryngology, Escola Paulista de Medicina, Brazil (1986). Professor, Federal University of Parana, Brazil.

Institution: Hospital de Clinicas, Federal University of Parana HC / UFPR.  
Curitiba / PR - Brazil.

Mail address: Hospital de Clinicas da UFPR - Av. General Carneiro, 181 - Curitiba / PR - Brazil - Zip code: 80060-900 - Telephone: (+55 41) 3360-1800 - E-mail: cenf@hc.ufpr.br

Article received on July 11, 2010. Approved on August 22, 2010.

### SUMMARY

- Introduction:** The tympanoplasty aims to reconstruct the tympanic membrane, restoring protection to the middle ear and improve hearing. In this study we evaluated the surgical results and audiometric this surgery, performed in the service of Otorhinolaryngology, HC / UFPR by residents of the second year in the year 2008 and factors that may influence the results.
- Method:** A retrospective study through review of medical records.
- Results:** Among the 31 patients evaluated, there was closure of the perforation in 24 (80%) and hearing improvement with reduction or closure of the conductive gap by 60% and 26.7% respectively.
- Discussion:** The success rate of surgery was satisfactory and similar to that found in the literature, and factors such as age, presence of unilateral or bilateral pathology and size of perforation were not determinants of surgical success.
- Conclusion:** Tympanoplasty performed by residents of the second year of residence showed satisfactory results regarding both surgical audiometric.
- Keywords:** audiometry, treatment outcome, tympanoplasty, tympanic membrane.

### RESUMO

- Introdução:** A timpanoplastia tem por objetivo reconstruir a membrana timpânica, restaurando a proteção à orelha média e melhorando a audição. Nesse estudo foram avaliados os resultados cirúrgicos e audiométricos dessa cirurgia, realizada no serviço de Otorrinolaringologia do HC/UFPR por residentes do 2o ano durante o ano de 2008, bem como alguns fatores que possam influenciar nos resultados.
- Método:** Estudo retrospectivo, através de análise de prontuários.
- Resultados:** Dos 31 pacientes avaliados, houve fechamento da perfuração em 24 (80%) e melhora da audição com redução ou fechamento do gap condutivo em 60% e 26,7% respectivamente.
- Discussão:** A taxa de sucesso da cirurgia foi satisfatória, sendo similar à encontrada na literatura, sendo que fatores como idade, presença de patologia uni ou bilateral e tamanho da perfuração não foram fatores determinantes deste sucesso cirúrgico.
- Conclusão:** A timpanoplastia realizada por residentes do 2o ano da residência mostrou resultados satisfatórios tanto cirúrgicos quanto audiométricos.
- Palavras-chave:** audiometria, resultado de tratamento, timpanoplastia, membrana timpânica.

---

## INTRODUCTION

---

Otitis media (OM) is a worldwide prevalent disease. Despite all the scientific developments (antibiotics, technology and knowledge), the OM is still considered an important public health problem, since the ear pain, discomfort, hearing loss, otorrhea, psychological trauma and complications cause great personal suffering and family (1.3).

Chronic otitis media is characterized clinically as an inflammatory condition associated with persistent perforation of the tympanic membrane and otorrhea. Histologically can be defined as an inflammation of the middle ear associated with irreversible tissue changes. Can be subdivided into chronic otitis media without cholesteatoma (COMNC) and chronic otitis media (CCOM). The difference between these two groups is the presence or absence of cholesteatoma (1.3).

The main symptom presented by patients suffering from simple COMNC intermittent otorrhea is usually associated with episodes of upper airway infections or a history of extrinsic contamination (swimming pool, sea), painless, odorless, accompanied by hearing loss. Otoscopy usually find a hole in the tense part of the tympanic membrane of varying size and shape, and the middle ear mucosa that looks almost normal except for some degree of hyperemia (1.3).

The tympanic membrane (TM) consists of three layers: an outer layer composed of keratinized squamous epithelium, an intermediate mesodermal fibrous layer and an inner endodermal mucosal layer. When in a solution of continuity, MT regenerates from two mechanisms of epithelial migration known. One is the centrifugal movement from the navel of Mt. The second pattern mitotic considered essential to the healing of continuity solutions, is the centripetal force, which occurs throughout pars tensa of TM, with more activity around the tympanic ring. In myringoplasty, the graft serves as a replacement of the stratum corneum current slide on which epithelial migration in order to repair the perforation (2.4).

Tympanoplasty type 1 and myringoplasty, simple surgeries to COMNC, aim the reconstruction of the tympanic membrane, restoring the sound to the round window protection by obtaining a cavity filled with air and restore the mechanisms that drive the sound, improving hearing and cessation of otorrhea (5).

In this study we evaluated the surgical results and audiometric these surgeries in our hospital in 2008, for second year residents, under the supervision of one

tutor (MB) as well as factors that might influence the results.

---

## METHOD

---

Included in this study were 30 ears of 21 patients with simple COMNC, submitted to myringoplasty tympanoplasty type 1 in the Clinical Hospital of Curitiba in 2008, for second year residents, under supervision of a preceptor same (MB).

The study was retrospective, based on chart review and was approved by the Ethics in Human Research of Hospital de Clínicas / UFPR. Patients were evaluated before surgery by residents and by the same adviser (MB) through anamnesis, ENT examination and audiometric testing.

In the interview, patients were questioned about the onset of symptoms, history of otorrhea, otorrhea free period, with control of eardrops and care not to wet the ear associated with infection of the upper airways, and a history of otological surgery and nasal complaints. Otoscopy characteristics were evaluated, size and position of the hole, drawing it in the chart, in addition to complement the ENT examination. All patients underwent audiometry and speech prior to surgery.

The surgical techniques used were “in-lay” for small holes and the “underlay” with retroauricular access to other types of perforations. Regarding the type of graft, temporalis fascia was used for technical or halo “underlay” and the tragus cartilage with perichondrium technique for “in-lay.”

The technique “underlay” by retroauricular in achieving: 1) infiltration with xylocaine + adrenaline 1: 50,000 retroauricular area and external auditory canal, 2) making patchwork Lempert I, II and III by transmeatal (Lempert I: incision starts at the tympanic ring, including skin and periosteum and extends out along the junction of the superior and posterior wall of external auditory canal, above the apex of the triangle supra-meatal. Lempert II: The incision starts in the ring tympani, attached to the junction of the posterior and inferior walls of the external auditory canal and ends in the lower portion of the anterior edge of the shell. Lempert III: the incision follows the posterior margin of the tympanic canal, covering the skin and periosteum, joining the first two incisions (6).) 3) retroauricular incision of the skin and subcutaneous tissue, with removal of the fascia graft halo or temporal, 4) construction of the periosteal flap and detachment to find the incisions in the ear canal, (5) revival of the edges of perforation with removal of plates tympanosclerosis, 6) detachment and folding the flap tympanomeatal (as the

position and size of perforation, incision in the ear canal is enlarged and is formerly a detached retail tympanomeatal malleolar ligament posterior to anterior malleolar ligament), 7) Revision ossicular; 8) Placing the fascia graft under the malleus and the incus, 9) Repositioning of the flap tympanomeatal; 10) If necessary, place an "gelfoam" underneath the graft; 11) Placement "gelfoam" tympanomeatal pressing the flap over the external auditory canal, 12) suture by planes, 13) external dressing.

The technique "in-lay" was accomplished through: (1) scraping the edges of the tympanic membrane by transmeatal, (2) graft preparation with cartilage and perichondrium of drink, forming a spool, (3) grafting of Just as you place a ventilation tube.

The postoperative follow-up was with initial returns at 2, 7, 30, 60 and 90 days later and returns regularly. The audiometric tests were performed between 90 and 180 days postoperatively.

## RESULTS

Underwent tympanoplasty 30 ears of 21 patients with chronic otitis media, with 16 (76%) females and 5 (24%) males, mean age 30.1 years, ranging from 7 to 64 years.

Of 21 patients, 13 (62%) had bilateral disease and 8 (38%) unilateral. Among those with bilateral perforation, 8 underwent tympanoplasty in the two ears at different times in 2008 and both included in the study. In only one case the surgery was performed in 2 ears in both surgical technique with an "underlay" and retroauricular with another technique "in-lay" with tragus cartilage graft. Observing the surgical outcome of 22 operated ears when there was bilateral pathology, 18 (81.8%) had perforation closure and 8 with unilateral pathology, 6 (75%) had the same result.

Of the 30 ears operated on, 20 (66.7%) was the left ear and 10 (33.3%) right ear. With respect to surgical outcome, 15 (75%) of 20 left ears and 9 (90%) of 10 right ears were operated tympanic membrane perforations.

With regard to location and size of perforation, 12 (40%) ears had extensive drilling, ie, that affected much of the pars tensa of the tympanic membrane, affecting the posterior and anterior quadrant, 12 (40%) had perforations located in posterior quadrants and 6 (20%) had perforations in previous quarters. Of the 12 cases with large perforations, 10 (83.3%) had perforation closure and 2 (16.7%) had residual perforation. Considering the 12 ears with holes later, 9 (75%) stopped the drilling and 3 (25%) did not close. Of the 6 cases with perforations above, 5 (83.3%)

had neotympano intact postoperatively and 1 (16.7%) continued drilling.

The main technique used was the "underlay" by retroauricular access with fascia graft halo or temporal in 28 ears (93.3%) and in 2 cases (6.6%) where drilling was little we used the technique in-lay "with a graft of cartilage and perichondrium of the draft.

The surgical success, considering the closure of tympanic membrane perforation was 24 ears (80%). In relation to audiometry, the vast majority of patients had hearing improvement. Comparing the average of the airway (AW) of the frequencies 0.5, 1 and 2 kHz and post-operative evaluation of all ear surgery; we observed an average improvement of 12.3 dB. If we consider only the ears that showed closure drilling, the average improvement was 14.1 dB mVA. Regarding the "gap" conductive, in 8 cases (26.7%) was closed in 18 cases (60%) decreased in 3 (10%) and remained unchanged in 1 case (3.3%) the gap "increased. In the latter case there was closure of the perforation, but the patient had an otitis media with effusion postoperatively that was being treated.

## DISCUSSION

The first surgery with the goals of closing tympanic membrane perforation dating from 1878 described by Berthold, being more consolidated after 1952 by WULLSTEIN (7).

The main objectives of tympanoplasty are getting a dry middle ear through a tympanic membrane was intact, and an audiometric improvement. The success rate in the literature shows a wide variation (8).

In our study we found a success rate of 80%, when evaluating the closure of the perforation, which can be considered a satisfactory result in view of the socio-economic population studied and the fact that the surgeries were performed by residents of the second year. SHEEHY (9) in a review of 472 cases showed a closure rate of TM perforation 97%, while KOTECHA (10), in their study showed a rate of 82.2%. BLACK (11) showed a surgical success of 66.6%, and PINAR (12) found 74.4%. BUNZEN (4) in a review of 97 ears underwent tympanoplasty, intact neotympano obtained postoperatively in 80.4% of cases and FUKUCHI (3) in a study with 37 patients at the Medical College of ABC got 51.4% closing the perforation of TM in the first surgery and 65% considering the re-operations.

Age is one factor that does not alter the rate of success in tympanoplasty. In the elderly population should make a pre-anesthetic evaluation more rigorous, besides

conducting a careful preoperative evaluation with the patient's nutritional status, cardiovascular status, metabolic and mental conditions (13). As for the pediatric population, should be attentive to the child's psychological profile, which must conform strictly to measures of rest and ear protection, and the age sufficient for adequate development of the mastoid, the Eustachian tube and immunity (14). The success rate of tympanoplasty in children is probably not an age issue but an issue of patient selection. It is considered a safe procedure, with anatomic and functional results comparable to that reported for adults (15,16,17).

Comparing the surgical outcomes when patients had unilateral or bilateral pathology found no significant difference between the results because similar values and given the relatively small number of patients. PINAR (12) in a study evaluating 231 patients showed that the healthy opposite ear can be considered an independent prognostic factor for surgical success.

Normally we did not perform bilateral tympanoplasty in the same surgical time in our department, except in cases where at least one side is the technique performed "in-lay" with tragus cartilage graft.

CAYE-THOMASEN et al (18) in their study evaluated 26 patients undergoing bilateral myringoplasty in the same surgical time, mostly by transcanal and "onlay", showing good results and good acceptance by patients.

The perforations located in the quadrants represent an earlier surgical approach to achieve the worst front edge, and are less vascularized, which leaves them with a worse prognosis. For many authors, the site of perforation is considered a more important parameter than its size to the success of surgery (8,19). In this study, we found no significant difference in surgical results when comparing the perforations, perhaps by the relatively small number of cases evaluated.

The vast majority of operated ears had hearing improvement with reduction or closure of the gap air-bone, even some who persisted with residual perforation. In only three cases, the hearing remained the same, with the same gap, "and in one case there was an increase of the gap despite the air-bone closure of perforation, because the patient have done otitis media with effusion in the postoperative period, being solved.

Lateralization and "blunting" are possible complications after surgery of tympanoplasty. Both can cause persistent conductive hearing loss. The first occurs when the surface of the tympanic membrane is located lateral to the bony ring and loses contact with the conduction mechanisms of the middle ear (20). The second occurs

when there is a loss of acute angle-tympanic meatal earlier, usually by surgical technique failure or fibrosis during healing (21). In our study no cases of lateralization of the tympanic membrane or "blunting."

The surgical success found in our study shows results similar to previous work in our service. COIFMAN (22) in his dissertation in 1992 evaluated 101 patients who underwent tympanoplasty at the Clinical Hospital of Curitiba and found a closure rate of tympanic membrane perforation of 81.19%.

---

## CONCLUSION

---

Surgical and audiometric results obtained in this work can be accepted as satisfactory and as expected by the literature, considering that the surgeries were performed by residents of the second year and also considering the socioeconomic status of the study population who often can hinder the acquisition of prescription drugs and proper care after surgery.

---

## BIBLIOGRAPHIC REFERENCES

---

1. Costa SS, Sousa LCA. Otite média crônica não-colesteatomatosa. In: Campos CAH, Costa HOO. Tratado de Otorrinolaringologia. São Paulo: Roca; 2002. p. 72-92.
2. Costa S, Cruz OLM, Kluwe LHS, Smith MM. Tympanoplastias. Em: Cruz, OLM e Costa, S (eds). Otologia clínica e cirúrgica. 1ª ed. São Paulo: Editora Revinter; 1980, pp. 245-271.
3. Fukuchi I, Cechiari DP, Garcia E, Rezende CEB, Rapoport PB. Tympanoplastias: resultados cirúrgicos e análise dos fatores que podem interferir no seu sucesso. Rev Bras Otorrinolaringol. 2006, 72(2):261-6.
4. Bunzen D, Campos A, Sperandio F, Neto SC. Influência dos Achados Intra-operatórios no Resultado Anatômico das Miringoplastias. Arq Int Otorrinolaringol. 2006, 10(4):284-288.
5. Cruz OLM, Costa SS, Kluwe LH, Smith MM. Tympanoplastias. In: Cruz OLM, Costa SS. Otologia Clínica e Cirúrgica. Rio de Janeiro: Revinter; 2000. p.245-70.
6. Porto G. Da cirurgia no tratamento das otites médias supuradas crônicas. Rev Bras Otorrinolaringol. 1958, 26(5):15-25.
7. Albert Mudry, MD, PhD, Lausanne, Switzerland. History of myringoplasty and tympanoplasty type I.

- Otolaryngology-Head and Neck Surgery. 2008, 139:613-614.
8. Bhat NA, Ranit De. Retrospective Analysis of Surgical Outcome, Symptom Changes, and Hearing Improvement Following Myringoplasty. *J Otol.* 2000, 29(4):229-32.
9. Sheehy JL et Anderson RG. Myringoplasty. A review of 472 cases. *Ann Otol Rhinol Laryngol.* 1980, 89(4 Pt 1):331-4.
10. Kotecha B, Fowler S, Topham J. Myringoplasty: a prospective audit study. *Clin Otolaryngol.* 1999, 24(2):126-9.
11. Black JH, Wormald PJ. Myringoplasty-effects on hearing and contributing factors. *S Afr Med J.* 1995, 85(1):41-3.
12. Pinar E, Sadullahoglu K, Calli C, Oncel S. Evaluation of prognostic factors and middle ear risk index in tympanoplasty. *Otolaryngology-Head and Neck Surgery.* 2008, 139:386-390.
13. Emmett JR. Age as a factor in the success of tympanoplasty: A comparison of outcomes in the young and old. *Am J Otol.* 1996, 28:285-6.
14. Berger G, Berger S. Paediatric revision myringoplasty: outcomes and prospects. *J Laryngol Otol.* 2002, 116:690-4.
15. Lin A, Messner A. Pediatric tympanoplasty: factors affecting success. *Current Opinion in Otolaryngology & Head and Neck Surgery.* 2008, 16:64-68.
16. Skolnick J, Mantle B, Li J, Chi D. Pediatric Myringoplasty: Factors That Affect Success-A Retrospective Study. *Laryngoscope.* 2008, 118:723-729.
17. Ribeiro J, Cerejeira R, Soares V, Gapo C, Romao J, Paiva A. Pediatric Tympanoplasties: Anatomical and Functional Results. *Scientific Oral Presentations,* p67.
18. Caye-Thomasen P, Nielsen T, Tos M. Bilateral Myringoplasty in Chronic Otitis Media. *Laryngoscope.* 2007, 117:903-906.
19. Gersdorff M, Garin P, Decat M, Juantegui M. Myringoplasty: long-term results in adults and children. *Am J Otol.* 1995, 16(4):215-8.
20. Sperling NM, Kay D. Diagnosis and Management of the Lateralized Tympanic Membrane. *The Laryngoscope.* 2000, 110(12):1987-1993.
21. Eby T. Prevention and Treatment of Tympanic Membrane Blunting. Middle ear mechanics in research and Otolology. *Proceedings of the 4th International Symposium.* 2006, p:177-182.
22. Coifman H. Miringoplastia: Análise dos resultados cirúrgicos para avaliação de seu aprendizado em serviço universitário. *Rev Bras Otorrinolaringol.* 1992, 58(2):108-112.