

EVALUATION OF REVISION SURGERY IN CHRONIC SUPPURATIVE OTITIS MEDIA (MUCOSAL TYPE): ASSESSING EFFICACY AND LONG-TERM RESULTS

Kartik Narkhede¹, Anoushka Sahai¹, Hetal Marfatia², Ashwinikumar Gaikwad¹, Juilee Kamble³

Received : 11/06/2023
Received in revised form : 17/07/2023
Accepted : 30/07/2023

Keywords:

Chronic suppurative otitis media, tympanoplasty, revision surgery, graft uptake, comorbidities.

Corresponding Author:

Dr. Anoushka Sahai,

Email: dranoushkasahai@gmail.com

DOI: 10.47009/jamp.2023.5.4.215

Source of Support: Nil,

Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (4); 1071-1075



¹Senior Resident, Department of ENT and Head-Neck Surgery, Seth G.S. Medical College and KEM Hospital, Mumbai, India.

²Professor and Head of Department, Department of ENT and Head-Neck Surgery, Seth G.S. Medical College and KEM Hospital, Mumbai, India.

³Junior Resident in the Department of ENT and Head-Neck Surgery, Seth G.S. Medical College and KEM Hospital, Mumbai, India.

Abstract

Background: Chronic suppurative otitis media (CSOM) is a prevalent condition in developing countries, causing hearing impairment due to chronic inflammation of the middle ear structures. Tympanoplasty, a common ear surgery, aims to repair the perforated tympanic membrane. Despite the generally successful outcomes, there are cases of surgical failure attributed to various factors like active infection, wound healing issues, graft material choice, eustachian tube dysfunction, and comorbidities. This study aims to identify the factors responsible for the failure of tympanoplasty in cases of CSOM (mucosal type) and develop a management protocol for revision surgeries. The study seeks to investigate the causes of surgical failure in cases of CSOM (mucosal type) and devise a management protocol for revision surgeries. Additionally, it aims to assess the outcomes of revision tympanoplasty with simple mastoidectomy. **Materials and Methods:** The study was an observational ambispective conducted in a tertiary care hospital from January 2020 to June 2021, involving 15 patients aged 18-60 years who had either directly presented or were referred with failed previous tympanoplasty. Patient data, surgical details, associated nasal complaints, and medical history were recorded. Preoperative assessments included Pure Tone Audiometry and imaging. Revision Tympanoplasty with Simple Mastoidectomy was performed on all patients. Postoperative follow-ups evaluated graft uptake, hearing improvement, and absence of infection. **Result:** Majority of the patients were in the age group of 31-40, with more females than males. Anteroinferior was the most common site of perforation, and temporalis fascia was the most frequently used graft material. The underlay technique was preferred for graft placement. Allergic rhinitis, deviated nasal septum, and GERD were among the associated nasal pathologies. Pseudomonas aeruginosa was the primary causative organism in the majority of cases. Patients with comorbidities such as diabetes mellitus and smoking history were observed. The mean postoperative hearing threshold showed significant improvement, and 93.3% of patients had successful graft uptake. **Conclusion:** Failure in tympanoplasty depends on factors like persistent upper respiratory tract infection, surgical technique, and patient-related comorbidities. Proper clinical evaluation is necessary to address potential causes of primary surgery failure before revision. Coupling a simple mastoidectomy with revision tympanoplasty can increase success rates.

INTRODUCTION

Chronic suppurative otitis media (CSOM) is the chronic inflammation of the mucoperiosteal lining of the middle ear cleft. i.e eustachian tube, middle ear, aditus and mastoid air cells which presents with persistent ear discharge through the tympanic

membrane perforation. It is the most common cause of hearing impairment in our country. Incidence of CSOM is higher in developing countries because of poor socioeconomic status and poor nutritional status, leading to constant exposure of middle ear for re-infection and hearing disability.

Tympanoplasty is one of the commonest ear surgeries done in ENT setup. It is done to remove the middle ear pathology with reconstruction of the perforated tympanic membrane with or without ossicular reconstruction.

Fortunately, successful results are so consistent and universal today that restoration of the tympanic membrane is expected. However, even in experienced hands tympanoplasty can fail. A number of causes have been recognised for the failure of tympanoplasty including active infection at the time of surgery, poor wound healing, site and size of tympanic membrane perforation, graft material used, eustachian tube dysfunction, mastoid reservoir of infection, surgeon's level of experience, smoking and associated comorbidities.

This study aims at identifying the various factors responsible for failure of surgery done for CSOM (mucosal type). It aims to devise the management protocol for revision cases as well as evaluate the outcomes of revision surgeries done for CSOM.

MATERIALS AND METHODS

Observational ambispective study done in a tertiary care hospital from January 2020 to June 2021 involving 15 patients (18-60 years) who directly presented to ENT OPD or were referred from other hospitals with failed previous tympanoplasty.

Details of the previous surgical technique including the approach, the graft material were noted. Additionally, the onset and duration of ear discharge and hearing impairment since the previous surgery were recorded.

Associated nasal complaints like obstruction, recurrent rhinitis, allergic symptoms and history of recurrent sore throat were ruled out. History of diabetes, hypertension, Covid-19 infection and any addiction were also taken into consideration.

Pre operatively, a Pure Tone Audiometry was done to look for type and degree of hearing impairment. Air-Bone gap was noted. Ear swab was sent for culture and antibiotic susceptibility in case of active infection. Oto-endoscopy was done for each patient to confirm the otoscopic findings using a 0-degree Hopkins telescope (Karl Storz, Germany). High resolution computed tomography scan of temporal bone was done to look for patterns of pneumatization and to rule out any reservoir of infection in the mastoid. A Diagnostic Nasal Endoscopy was performed on a HD TV camera system, Storz Professional Image Enhancement System (SPIES) using a 0 degree Hopkins telescope (Karl Storz, Germany) to rule out any nasal pathology including deviated nasal septum, spur and signs of allergic rhinitis. A computed tomography scan of para nasal sinuses was done if required as per the Diagnostic nasal endoscopy. Patients having deviated nasal septum and/or sinusitis underwent Septoplasty with/without FESS.

Patients with GERD were given a course of antireflux medications for at least 12 weeks. All patients were posted for Revision Tympanoplasty with Simple Mastoidectomy.

Postoperatively, the patients were kept in ward for 1 day and antibiotics, oral antihistaminics, nasal decongestants were given. Patients were discharged with the same.

Patients were followed up every week for the next 2 weeks, fortnightly for the next month. Ear drops containing antibiotic and steroid were started at 7th day post suture removal. Patients were evaluated on OPD basis for the status of neotympanum and uptake of graft, presence of discharge, rhinitis, post nasal drip. Final hearing assessment was done at 6 weeks with the help of pure tone audiogram. Post operative hearing improvement, reduction in Air bone gap was documented. An intact neotympanum with no residual perforation or infection was considered as successful uptake of graft.

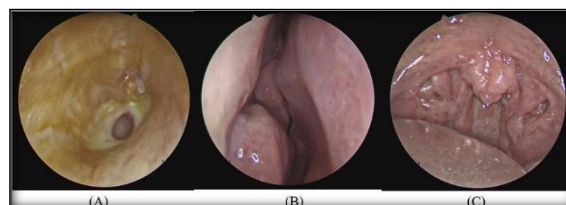


Figure 1: (A) Oto endoscopic picture of left Anterior residual perforation with greenish discharge. (B) Diagnostic Nasal Endoscopy Showing Deviated Nasal Septum towards Right with Inferior Turbinate Hypertrophy (C) Reflux Pharyngitis with Tonsillitis

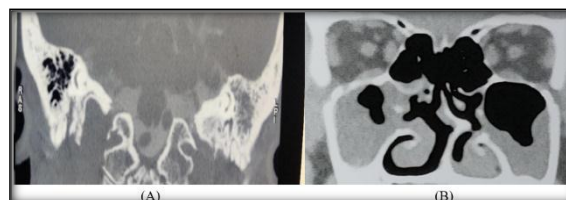


Figure 2: (A) HRCT Temporal Bone s/o Right Pneumatic mastoid while Left side s/o Mastoiditis. (B) CT PNS showing spur impinging upon the middle turbinate. The patient had left sided residual central perforation resulting from a previous tympanoplasty

RESULTS

In our study, majority of the patients were in the age group of 31-40(40%). There were 7 males and 8 females in our study. Bilateral perforation was seen in 3 patients, while right sided and left sided perforation was seen in 7 and 5 patients respectively.

Post aural approach (8 patients) was the most commonly used previous surgical approach in our study population, while 3 had undergone endaural approach and 4 had undergone an endomeatal approach for repair of the tympanic membrane perforation.

9 patients (60%) had ear surgery done 1-5 years back, while 6 patients were operated recently (6 months- 1 year).

DISCUSSION

The mean duration was 16.80 months with standard deviation of 8.402 months. 7 patients (46.66%) had onset of ear discharge after 1-5 years of previous surgery while 4 patients (26.66%) started discharge after 6 months-1 year of previous surgery. 8.60 months was observed as the mean duration of discharge post surgery with standard deviation of 5 months.

In our study the majority of patients 11 (73.33%) had previous surgery done microscopically, while 26.67% were operated with an endoscopic approach. Most common site of perforation in our study was anteroinferior (46.6%), while 4 had each of anterosuperior and posterosuperior perforation.

The size of perforation in 8 patients (53.33%) was of moderate size. While 3 patients had large size perforation and 4 had small perforation. Majority of the patients 73.3% were previously operated by underlay technique and the rest were operated using overlay. In 73.3% patients, temporalis fascia was used, while 26.7% patients were operated using cartilage. 26.6% each had allergic rhinitis and deviated nasal septum respectively, which accounted for the maximum number for the associated nasal pathology. Majority (53.3%) of patients had Gastroesophageal reflux disease at the time of presentation. 8 out of 15 patients reported *Pseudomonas aeruginosa* as the primary causative organism in our study population at the time of their initial presentation.

6 out of 15 patients (40%) had history of Type II Diabetes mellitus, 5 out of 15 (33.3%) had history of smoking while 2 patients had Covid -19 infection in the past.

The mean preoperative Hearing threshold was 41.2 dB (Range 26dB to 76 dB) with Standard deviation of 12.605 dB.

The mean postoperative Hearing threshold was 27.27 dB (Range 23 dB to 33 dB) with standard deviation of 3.150 dB.

There was 13.50 dB mean Hearing improvement in our patients, with standard deviation of 10.186.

14 patients had successful graft uptake at 6 weeks post operative follow up while 1 had residual perforation accounting for 93.30% of graft uptake.

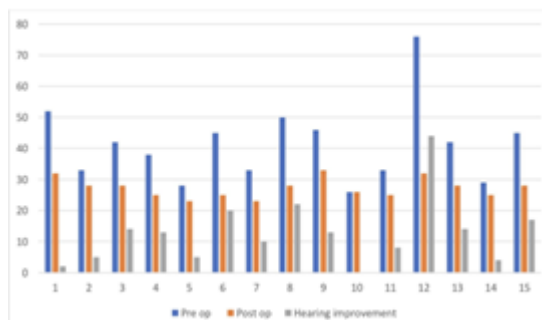


Image 1: Comparison of Preoperative and post operative hearing on pure tone audio gram (in dB)

Tympanoplasty is performed to remove middle ear pathology with or without ossicular reconstruction along with repair of the perforated tympanic membrane. The success rate in tympanoplasty varies from 75 to 98%.^[1]

The age of the patient, the size and site of perforation, eustachian tube functionality, the status of the middle ear mucosa, the type of graft and surgical experience have a role in predicting the outcome of surgery. In recent days, underlay technique is preferred for tympanoplasty.

In our study, female patients outnumbered the male patients (53%) which was similar to a study done by Ruhl et al,^[2] which had 60% females.

Mean age group of our study was 34.26 years with 40% in the age group of 31-40 years, however in a study done by Kaur et al,^[3] maximum number of patients were in the age group of 20-29 years

9 patients (60%) had persistent ear discharge after 1-5 years of previous surgery which was in accordance with the study done by Gautam Bir Singh et al,^[4] which had 53% of the patients with persistent ear discharge after 1-5 years of previous surgery.

The size of perforation of tympanic membrane depends on duration and severity of middle ear inflammation. Persistent ear discharge can be seen from both large perforations as well as pinpoint perforations. Perforation including less than 25% of surface area of tympanic membrane was called a small, 25-50% surface area involvement as moderate while more than 75% as large perforations.

54% of the patients had moderate size perforation which was similar to the study by Kakkar et al.^[5]

The site of perforation is also an important factor in success of graft uptake, as anterior perforation has been observed with higher failure rate. Anterior perforations are more difficult to access and the blood supply is also poorer. Our study showed 46% patients had a residual perforation in the anteroinferior region while the study done by Gautam Bir Singh et al,^[4] accounted for 76.5% of total patients of central perforation.

Graft uptake also depends on whether the previous surgery was done microscopically or with the help of endoscope. Anterior perforations can be easily repaired with endoscopes as the scope can be easily negotiated through the EAC and the wide angle of scope brings the tympanic membrane in one frame. The chances of failure are more in microscopic approach. Most of the cases were done microscopically in our setup. Among the cohort 73.3% of patients previously underwent conventional surgery while 26.7% were operated endoscopically. Yang, Q., Wang, B., Zhang, J. et al. in his study found more failure rates in conventional than endoscopic method which was in concordance with our study.^[6]

Tympanoplasty can be achieved using various types of grafts including Temporalis fascia, perichondrium, fascia lata or cartilage. Temporalis fascia is most

commonly used since it is abundantly available and can be accessible through the same incision.^[7] Kaur et al,^[3] reported a success rate of 88% using temporalis fascia which was similar to our study which observed 14 patients (93%) having successful uptake with temporalis fascia.

Technique used in tympanic membrane grafting also affects the results of myringoplasty, grafting can be accomplished by underlay technique or overlay technique.^[8] Among the revision cases about 61% had graft placed by underlay technique which was similar to 73% in the study by Gautam Bir Singh et al.

Allergic Rhinitis is an inflammatory reaction of the nasal and nasopharyngeal mucosa to allergens along with the middle ear and eustachian tube mucosa.^[9] We observed 26.6% patients having allergic rhinitis with previously failed tympanoplasty which was in accordance to the study done by Callioglu et al,^[10] that showed failure rate of 22% in patients with allergic rhinitis.

66.7% of patients had a preceding episode of upper respiratory tract infection before the onset of discharge after surgery. Saleem et al,^[11] in his study has quoted recurrent upper respiratory infection as a predominant cause of failure of tympanoplasty in about 40% of patients.

Gastroesophageal reflux disease is associated with eustachian tube dysfunction and middle ear disease and affect their surgical outcome.^[12] Our study had 53.3% of patients with symptoms of GERD at presentation.

Poorly pneumatized mastoids are more prone to tympanic membrane retraction, even in presence of a normally functioning eustachian tube, which can further increase the chance of surgical failure.^[13,14] A study by Ruhl et al,^[2] had 34% sclerosed mastoids while our study had 53.3% of sclerosed mastoids.

In our study, *Pseudomonas* was the most common organism isolated in 53% of patients with ear discharge. Eero et al,^[15] reported *pseudomonas* as a cause of persistent infection in 35% of operated patients.

Patients with comorbidities are more prone to post operative complications attributable to their poor general health and co-existing medical problems. Careful pre-operative clinical evaluation is therefore essential for recognising potential risk factors and for decreasing post operative morbidity and mortality.^[16,17] Cardiovascular problems, diabetes mellitus and hypothyroidism were more frequent co morbidities (71%) in study done by Lela et al, while our study had 40% of patients having diabetes mellitus. Cigarette Smoking has a significant negative effect on long term results in chronic suppurative otitis media surgery with a resultant failure in 60% of cases.^[18] Our study had 33.3% of patients with history of smoking.

The mean pre-operative hearing loss after the first surgery was 41.2 dB which reduced to a mean of 27.26Db post revision resulting in a mean

improvement of 14 dB whereas Kaur et al reported an improvement of 8.84 dB.

Our study showed 93.3% patients had successful graft uptake which was similar to various studies which quoted a success rate of 78.3 to 91.6%.^[19-21]

CONCLUSION

Failure in tympanoplasty depends on factors like persistent upper respiratory tract infection, the surgical technique and patient related factors like nutrition and associated comorbidities.

Proper clinical evaluation is necessary to rule out any persistent cause of failure.

Factors leading to failure of primary surgery like deviated nasal septum, tonsillitis and GERD should be addressed before commencing the revision surgery.

A simple mastoidectomy can be coupled with revision tympanoplasty to increase the success rate.

REFERENCES

1. Bayram A, Muluk NB, Cingi C, Bafaqeeh SA. Success rates for various graft materials in tympanoplasty—a review. *Journal of Otolaryngology*. 2020 Sep 1;15(3):107-11.
2. Ruhl CM, Pensak ML. Role of aerating mastoidectomy in noncholesteatomatous chronic otitis media. *The laryngoscope*. 1999 Dec;109(12):1924-7.
3. Kaur M, Singh B, Verma BS, Kaur G, Kataria G, Singh S, Kansal P, Bhatia B. Comparative evaluation between tympanoplasty alone and tympanoplasty combined with cortical mastoidectomy in non cholesteatomatous chronic suppurative otitis media in patients with sclerotic bone. *ISOR-JDMS*. 2014 Jun;13(6):40-5.
4. Singh GB, Kwatra D, Malhotra S, Kumar S. Circumferential subannular tympanoplasty: panacea for revision tympanoplasty. *American Journal of Otolaryngology*. 2020 Nov 1;41(6):102728.
5. Kakkar V. Role of cortical mastoidectomy on the results of tympanoplasty in tubotympanic type of CSOM. *Natl J Otorhinolaryngol Head Neck Surg*. 2014;2(11):3.
6. Yang, Q., Wang, B., Zhang, J. et al. Comparison of endoscopic and microscopic tympanoplasty in patients with chronic otitis media. *Eur Arch Otorhinolaryngol* 279, 4801–4807 (2022). <https://doi.org/10.1007/s00405-022-07273-2>
7. Bayram A, Bayar Muluk N, Cingi C, Bafaqeeh SA. Success rates for various graft materials in tympanoplasty - A review. *J Otol [Internet]*. 2020;15(3):107–11. Available from: <https://www.sciencedirect.com/science/article/pii/S1672293019301370>
8. Sergi B, Galli J, De Corso E, Parrilla C, Paludetti G. Overlay versus underlay myringoplasty: report of outcomes considering closure of perforation and hearing function. *Acta Otorhinolaryngol Ital*. 2011;31(6):366–71.
9. Bakhshae M, Rajati M, Fereidouni M, Khadivi E, Varasteh A. Allergic rhinitis and chronic suppurative otitis media. *Eur Arch Otorhinolaryngol*. 2011 Jan;268(1):87-91. doi: 10.1007/s00405-010-1290-3. Epub 2010 Jun 11. PMID: 20544354.
10. Callioglu EE, Bercin AS, Kale H, Muderris T, Demirci S, Tuzuner A, Korkmaz MH. Is allergic rhinitis a factor that affects success of tympanoplasty?. *ACTA MEDICA*. 2016 Apr 30;59(1):10-3.
11. Niazi SA, Ahmed A, Rafique U, Ahmed M. EFFECTS OF A FOCUS OF INFECTION IN THE UPPER RESPIRATORY TRACT ON THE OUTCOME OF MYRINGOPLASTIES. *Khyber Medical University Journal*. 2012 Jul 1;4(3).
12. Habesoglu TE, Habesoglu M, Kalaycik C, Tek A, Surmeli M, Egeli E. Gastroesophageal reflux disease and tympanoplasty

- surgical outcome: is there a relationship?. *The Journal of Laryngology & Otolaryngology*. 2012 Jun;126(6):580-5.
13. Hindi K, Alazzawi S, Raman R, Prepageran N, Rahmat K. Pneumatization of mastoid air cells, temporal bone, ethmoid and sphenoid sinuses. Any correlation? *Indian J Otolaryngol Head Neck Surg* [Internet]. 2014 [cited 2023 Jul 27];66(4):429–36. Available from: <http://dx.doi.org/10.1007/s12070-014-0745-z>
 14. Holmquist J, Renvall U, Svendsen P. Eustachian tube function and retraction of the tympanic membrane. *Ann Otol Rhinol Laryngol* [Internet]. 1980;89(3_suppl):65–6. Available from: <http://dx.doi.org/10.1177/00034894800890s318>
 15. Vartiainen E, Vartiainen J. Effect of aerobic bacteriology on the clinical presentation and treatment results of chronic suppurative otitis media. *The Journal of Laryngology & Otolaryngology*. 1996 Apr;110(4):315-8.
 16. Nishant MB, Aneesa AM, Rajamma KB. Effect of common comorbidities on the success rate of myringoplasty [Internet]. *Ijss-sn.com*. [cited 2023 Jul 27]. Available from: http://www.ijss-sn.com/uploads/2/0/1/5/20153321/10_ijss_may_oa_10_-_2019.pdf
 17. Wu C-H, Cheng R-M, Tsai H-C, Chang C-C, Chang H, Liao C-C, et al. How comorbidities and preoperative expenditures correlate with postoperative adverse outcomes. *Am J Manag Care* [Internet]. 2012 [cited 2023 Jul 27];18(11):e405-15. Available from: <https://www.ajmc.com/view/how-comorbidities-and-preoperative-expenditures-correlate-with-postoperative-adverse-outcomes>
 18. Gaur K, Kasliwal N, Gupta R. Association of smoking or tobacco use with ear diseases among men: a retrospective study. *Tob Induc Dis* [Internet]. 2012 [cited 2023 Jul 27];10(1):4. Available from: <http://dx.doi.org/10.1186/1617-9625-10-4>
 19. Balyan FR, Celikkanat S, Asian A, Taibah A, Russo A, Sanna M. Mastoidectomy in noncholesteatomatous chronic suppurative otitis media: is it necessary?. *Otolaryngology—Head and Neck Surgery*. 1997 Dec;117(6):592- 5.
 20. McGrew BM, Jackson CG, Glasscock III ME. Impact of mastoidectomy on simple tympanic membrane perforation repair. *The Laryngoscope*. 2004 Mar;114(3):506-11.
 21. Toros SZ, Habesoglu TE, Habesoglu M, Bolukbasi S, Naiboglu B, Karaca CT, Egeli E. Do patients with sclerotic mastoids require aeration to improve success of tympanoplasty?. *Acta oto-laryngologica*. 2010 Aug 1;130(8):909- 12.