

ORIGINAL RESEARCH

Evaluating the surgical advantages of type 1 tympanoplasty with and without mastoidectomy in child subjects having chronic suppurative otitis media with tympanic membrane perforation

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ABSTRACT

Background: Combining tympanoplasty with mastoidectomy in child subjects is considered beneficial assuming the vital role of the mastoid in middle ear ventilation owing to the immature system of the Eustachian tube. **Aim:** The present study aimed to assess the surgical advantages of type 1 tympanoplasty with and without mastoidectomy in child subjects having chronic suppurative Otitis media with tympanic membrane perforation. **Methods:** The present retrospective study assessed pediatric subjects (<18 years) that underwent type 1 tympanoplasty for chronic suppurative otitis media. The subjects were divided into 2 groups namely tympanoplasty with canal wall-up mastoidectomy and tympanoplasty without mastoidectomy. Surgical success was considered for intact tympanic membrane and no recurrence of disease after 2 years of follow-up. **Results:** In Group I, type 1 tympanoplasty alone was done in 30.5% (n=36) of study subjects, and tympanoplasty and mastoidectomy in 69.5% (n=82) subjects of Group II. In Group I, preoperative ABG was 20 ± 10.3 and in Group II, it was 16 ± 10.5 . Postoperatively, ABG was higher in Group I at 9.4 ± 7.3 compared to Group II where it was 5 ± 6.3 . However, the difference was statistically non-significant with $p=0.09$. The mean gap closure was lower in group I with 12.3 ± 9.3 dB and was higher in Group II. The difference was statistically non-significant with $p=0.34$. The success rate for Group I (tympanoplasty with mastoidectomy) was 90.2% (n=74) subjects and 88.9% (n=32) for Group II (tympanoplasty alone). The difference was statistically non-significant with $p=0.73$. **Conclusion:** The study concludes that type 1 tympanoplasty is an effective treatment modality for chronic suppurative otitis media in child subjects. However, no improved outcomes are related to combined mastoidectomy with primary type 1 tympanoplasty.

Keywords: Chronic suppurative otitis media, mastoidectomy, pediatric otitis, tympanic membrane, type 1 tympanoplasty.

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INTRODUCTION

CSOM (chronic suppurative otitis media) describes the inflammation in the middle ear persisting for more than 3 months. Chronic suppurative otitis media is classified based on the presence of a cholesteatoma.¹ The chronic suppurative otitis media with non-cholesteatoma is classified as open tympanic

membrane chronic suppurative otitis media and close tympanic membrane chronic suppurative otitis media including the fibrous otitis media, atelectatic otitis media, and otitis media with effusion.²

Chronic suppurative otitis media includes recurrent episodic courses of otorrhea, perforation of the tympanic membrane, and conductive loss of hearing.³

Traditionally, chronic suppurative otitis media is managed surgically with mastoidectomy and tympanoplasty depending on the radiographic assessment of the defect in the communication of the mastoid cells and middle ear cleft, mastoid cell opacification, diseased mucosa, and chronic mastoiditis.⁴

The previous literature data and ongoing research show that combining tympanoplasty and mastoidectomy has no added advantages in treating adult subjects having chronic suppurative otitis media.⁵ However, many otologists have a different opinion and perform combined tympanoplasty and mastoidectomy in pediatric subjects with chronic suppurative otitis media based on the assumption that in pediatric subjects, a vital role is played by a mastoid process in the ventilation of the middle ear owing to immature Eustachian tube system.⁶

The present study aimed to comparatively evaluate the outcomes following the type 1 tympanoplasty combined with mastoidectomy to type 1 tympanoplasty alone in pediatric subjects with chronic suppurative otitis media.

MATERIALS AND METHODS

The present retrospective clinical study aimed to comparatively evaluate the outcomes following the type 1 tympanoplasty combined with mastoidectomy to type 1 tympanoplasty alone in pediatric subjects with chronic suppurative otitis media. The study population was recruited from the Department of ENT of the institute.

The study retrospectively assessed the medical records of the subjects with chronic suppurative otitis media treated at the institute. The subjects included were depending on the International Classification of Diseases 9th Revision, Clinical Modification. The inclusion criteria were subjects of age 18 years or less who were admitted to the institute for elective surgery for chronic suppurative otitis media. In these subjects, surgical protocols were assessed, and only the subjects who underwent type 1 tympanoplasty with or without mastoidectomy were included. Then, the subjects with minimum 2 years follow-up along with preoperative and postoperative audiological assessment with pure-tone hearing level conducted 6 months following surgery were finally included in the present study.

After the final inclusion of the study subjects, detailed data were recorded for all the subjects including the

preoperative and postoperative hearing levels, ontological examination results, surgery time, surgical technique, gender, and age of the included subjects. Four frequencies were used to assess the hearing status including 500, 1000, 2000, and 4000 Hz following the modified PTA (pure-tone average air-bone gap) technique followed by calculating the postoperative ABG (air-bone gap) closure by subtracting the mean postoperative PTA gap value (dB) from mean preoperative PTA gap value (dB) individually for each ear. The subjects were then divided into two groups where Group I subjects were managed using type 1 tympanoplasty with mastoidectomy and Group II subjects with type 1 tympanoplasty only without mastoidectomy.

The subjects were indicated for surgery when no sign of acute inflammation was seen and the otologists decided to perform the mastoidectomy along with clinical assessment for otitis. All the surgeries were conducted using the retroauricular approach and under general anesthesia. The graft material used was temporalis fascia placed in an underlay fashion. The surgical success was considered with intact tympanic membrane presence and no recurrence after a follow-up of 2 years.

The data gathered was analyzed statistically using SPSS software version 21.0, Chi-square, and Mann-Whitney test. The statistical significance was considered at $p < 0.05$.

RESULTS

The present retrospective clinical study aimed to comparatively evaluate the outcomes following the type 1 tympanoplasty combined with mastoidectomy to type 1 tympanoplasty alone in pediatric subjects with chronic suppurative otitis media. The subjects were divided into two groups where Group I subjects were managed using type 1 tympanoplasty with mastoidectomy and Group II subjects with type 1 tympanoplasty only without mastoidectomy. From the data of 250 subjects, only 118 met the criteria and were finally included in the study. There were 67.8% ($n=80$) males and 32.20% ($n=38$) females in the present study. The mean age of the study participants was 12.7 ± 1.6 years. The majority of the study subjects were in the age range of 67.79% ($n=80$) years followed by 27.11% ($n=32$) subjects from 15-18 years, and least 5.08% ($n=6$) subjects were from the age of < 7 years as depicted in Table 1.

Table 1: Age distribution of the study subjects

Factor	<7 years	8-14 years	15-18 years
Percentage (%)	5.08	67.79	27.11
Number (n)	6	80	32

In the present study, in Group I, type 1 tympanoplasty alone was done in 30.5% ($n=36$) of study subjects, and tympanoplasty and mastoidectomy in 69.5% ($n=82$) subjects of Group II. In Group I, preoperative

ABG was 20 ± 10.3 and in Group II, it was 16 ± 10.5 . Postoperatively, ABG was higher in Group I at 9.4 ± 7.3 compared to Group II where it was 5 ± 6.3 . However, the difference was statistically non-

significant with $p=0.09$. The mean gap closure was lower in group I with 12.3 ± 9.3 dB and was higher in Group II. The difference was statistically non-significant with $p=0.34$. The success rate for Group I (tympanoplasty with mastoidectomy) was 90.2%

($n=74$) subjects and 88.9% ($n=32$) for Group II (tympanoplasty alone). The difference was statistically non-significant with $p=0.73$ as shown in Table 2.

Table 2: Surgical outcomes in pediatric subjects with chronic suppurative otitis media

Group	Preop ABG	p-value	Postop ABG	p-value	Mean gap closure (dB)	p-value	Surgical success n (%)	p-value
II (tympanoplasty alone)	16 ± 10.5	-	5 ± 6.3	0.09	14 ± 8.2	0.34	32 (88.9)	0.73
I (tympanoplasty with mastoidectomy)	20 ± 10.3		9.4 ± 7.3		12.3 ± 9.3		74 (90.2)	

The surgical failure for the study was considered as the recurrence of the perforation of the tympanic membrane or the retraction of the tympanic membrane. In 118 ears treated in the present study surgical failure was considered for 12 ears. In Group I, retraction of the tympanic membrane was seen in two ears after 8 months of surgery and recurrence in the other two ears after 2 months of the surgery. In Group II, 6 perforations and two retractions were seen within 5 months of the surgery.

DISCUSSION

The present retrospective clinical study aimed to comparatively evaluate the outcomes following the type 1 tympanoplasty combined with mastoidectomy to type 1 tympanoplasty alone in pediatric subjects with chronic suppurative otitis media. The subjects were divided into two groups where Group I subjects were managed using type 1 tympanoplasty with mastoidectomy and Group II subjects with type 1 tympanoplasty only without mastoidectomy. There were 67.8% ($n=80$) males and 32.20% ($n=38$) females in the present study. The mean age of the study participants was 12.7 ± 1.6 years. The majority of the study subjects were in the age range of 67.79% ($n=80$) years followed by 27.11% ($n=32$) subjects from 15-18 years, and at least 5.08% ($n=6$) subjects were from the age of <7 years. These data were compared to the studies of Trinidade A et al⁷ in 2016 and Baysal E et al⁸ in 2013 where authors assessed subjects with demographic data comparable to the present study.

It was seen that, in Group I, type 1 tympanoplasty alone was done in 30.5% ($n=36$) study subjects, and tympanoplasty and mastoidectomy in 69.5% ($n=82$) subjects of Group II. In Group I, preoperative ABG was 20 ± 10.3 and in Group II, it was 16 ± 10.5 . Postoperatively, ABG was higher in Group I at 9.4 ± 7.3 compared to Group II where it was 5 ± 6.3 . However, the difference was statistically non-significant with $p=0.09$. The mean gap closure was lower in group I with 12.3 ± 9.3 dB and was higher in Group II. The difference was statistically non-significant with $p=0.34$. The success rate for Group I (tympanoplasty with mastoidectomy) was 90.2% ($n=74$) subjects and 88.9% ($n=32$) for Group II

(tympanoplasty alone). The difference was statistically non-significant with $p=0.73$. These results were consistent with the previous studies of Hardman J et al⁹ in 2015 and Webb BD et al¹⁰ in 2008 where authors reported similar results of the audiometric assessment in their study results as in the present study.

In the present study, surgical failure was considered as the recurrence of the perforation of the tympanic membrane or the retraction of the tympanic membrane. In 118 ears treated in the present study surgical failure was considered for 12 ears. In Group I, retraction of the tympanic membrane was seen in two ears after 8 months of surgery and recurrence in the other two ears after 2 months of the surgery. In Group II, 6 perforations and two retractions were seen within 5 months of the surgery. These findings were in agreement with the results of Lin AC et al¹¹ in 2008 and Abood A et al¹² in 2020 where similar results and failure rates were reported by authors in their studies.

CONCLUSION

Within its limitations, the present study concludes that type 1 tympanoplasty is an effective treatment modality for chronic suppurative otitis media in child subjects. However, no improved outcomes are related to combined mastoidectomy with primary type 1 tympanoplasty. However, further prospective longitudinal studies are warranted to reach a definitive conclusion.

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