



COMPARISON OF HEARING OUTCOME OF TYMPANOPLASTY WITH AND WITHOUT CANALPLASTY

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ABSTRACT

Widening of the external auditory canal not only grants better visualization of the tympanic annulus after drilling the posterior and inferior canal walls, but also aids in secure placement of the temporalis fascia graft and wide surgical access. This retrospective study included all adults who were diagnosed with mucosal type of COM and planned for surgical treatment (Myringoplasty). 100 patients (50 of whom had undergone canalplasty and 50 who hadn't) above 18 years of age diagnosed as COM from December 2015– March 2017 were included in the study. The mean post-operative A-B gap was 9.9 ± 3.8 dB and 10.1 ± 5.2 dB in patients who had and hadn't undergone canalplasty respectively, after the 3rd month of follow up. There was a statistically significant difference, on comparison of the improvement in A-B gap at the third post-op month. Other advantages of performing a canalplasty include excellent visualization and surgical access.

KEYWORDS

canalplasty, COM, myringoplasty, tympanoplasty

INTRODUCTION:

Chronic suppurative otitis media (CSOM) is one of the most prevalent ear diseases in India presenting in all age groups. The operative surgery for repair of a tympanic membrane perforation is a Myringoplasty.^{1,2} Over the past 10 to 20 years, this technique has been modified and revolutionized in terms of technique and approaches. One such procedure is a canalplasty, which is integral for complete exposure of the anterior edge of the tympanic annulus. Widening of the external auditory canal not only grants better visualization of the tympanic annulus after drilling the posterior and inferior canal walls, but also aids in secure placement of the temporalis fascia graft and wide surgical access.^{3,4}

OBJECTIVES

To compare Tympanoplasty with and without canalplasty in terms of improvement in hearing

MATERIALS AND METHODS

This retrospective study was conducted at the Department of Otorhinolaryngology and Head and Neck Surgery of R L Jalappa Hospital and Research Centre, Tamaka, Kolar. All adults diagnosed with mucosal type of CSOM and planned for surgical treatment (Myringoplasty) were included in the study.

Inclusion criteria

Patients above the age of 18 years with mucosal type of chronic otitis media.

Exclusion criteria

- Active stage of chronic otitis media
- Chronic otitis media with complications
- Ossicular discontinuity

Method of collection of data:

100 patients (50 of whom had undergone canalplasty and 50 who hadn't) above 18 years of age diagnosed as COM from December 2015– March 2017 were included in the study. Clinical history, ENT and otomicroscopic examination findings, pure tone audiometry (pre-operative and 3 month post-operative), operative technique and intraoperative findings were noted and analysed.

SURGICAL PROCEDURE:

A posterior transverse canal incision was placed just medial to the bony cartilaginous junction from 12 O'clock to 6 O'clock position and korner's flap was elevated. William Wilde's post auricular incision was placed. Incisions were taken from the 12 O'clock to 6 O'clock position to elevate an anteriorly based tympano-meatal flap. Posteriorly,

tympanotomy was performed after cutting the mucosal layer and elevating the annulus. In patients who underwent canalplasty, the external auditory canal was widened with cutting and diamond burrs removing any canal wall bulge or hump. Drilling was usually performed in the posterior and inferior canal wall. In case of anterior canal bulge, canal skin was elevated from lateral to medial upto the bony cartilaginous junction 3 mm lateral to the tympanic annulus, then using 3–0 diamond burr anterior canal bulge was reduced without exposing the temporomandibular joint. The ossicular status was assessed. The middle ear was filled with gel foam. The graft was placed by the underlay technique. The tympanomeatal flap was replaced and the graft was secured. The postaural wound was closed and mastoid dressing was applied. At the end of three weeks, the canal pack was removed.

Patients who underwent canalplasty were assigned to group A and those who hadn't were assigned to group B

Statistical analysis:

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. **Chi-square test** was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. **Independent t test** was used as test of significance to identify the mean difference between two quantitative variables.

MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyse data and a **p value** (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

RESULTS

In group A, 36.7% of patients belonged to the age groups of 30 to 40 years and in group B, 40% of patients were in the age group of 30 to 40 years. There was no statistically significant difference between both groups. The mean age of patients in group A was 36.2 ± 13.6 years and in group B was 36.8 ± 12.8 years; with no statistically significant difference. ($p=0.757$)

In group A, 59.7% were females and 40.3% were males, while in group B, 66.7% were females and 33.3% were males. There was no significant difference in gender difference between two groups. ($\chi^2 = 0.320$, $df=1$, $p=0.567$)

In group A, 59.7% were females and 40.3% were males, while in group B, 66.7% were females and 33.3% were males. There was no

significant difference in gender difference between two groups. ($\chi^2 = 0.320, df = 1, p = 0.567$)



Fig 1: Intra-operative image of extensive tympanosclerosis in the right ear- before performing a canalplasty

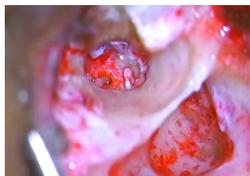


Fig2: intra-operative image of extensive tympanosclerosis in the right ear- after performing a canalplasty

In group A, the mean A-B gap in the pre-operative period was 32.3 ± 3.9 dB. The mean post-operative A-B gap was 9.9 ± 3.8 dB after the 3rd month of follow up. There was a statistically significant decrease in the mean A-B gap at all three intervals of follow-up ($p < 0.001$). On the other hand, in group B, the mean A-B gap in the pre-operative period was 31.7 ± 4.1 dB. The mean post-operative A-B gap was 12.1 ± 5.2 dB after the 3rd month of follow up. There was a statistically significant decrease in the mean A-B gap ($p < 0.001$).

The mean pre-operative A-B gap obtained in both groups were comparable, with no statistical significance ($p = 0.78$). We found that, there was a statistically significant difference between both methods, on comparison of the improvement in A-B gap at the third post-op month ($p = 0.005$).

DISCUSSION

Chronic otitis media (COM) is defined as chronic inflammation of the mucoperiosteum of the middle ear cleft causing permanent abnormality in the tympanic membrane.³ It is one of the most common causes of preventable hearing loss in India.⁶ Various modalities of treatment have been described in literature for the treatment of COM.

Canalplasty has evolved as a principal surgical procedure done in accompaniment with a tympanoplasty for a patient suffering from COM with permanent perforation. In our study we noticed a significant improvement in Air-Bone gap in patients who had undergone canalplasty to those who hadn't and also noticed better visualization and surgical access once the procedure was complete.

Vijendra et al achieved a 9 dB improvement in hearing in cases with canalplasty when compared to cases without canalplasty.³ According to this study, the benefits of routinely performing a canalplasty include better visualization, facilitation of the anterior anchoring of graft in subtotal perforation, better exposure for ossiculoplasty, time gain – The time spent for performing a canalplasty is compensated by the time gained by improved exposure during grafting of tympanic membrane, prevents lateralization of tympanic membrane.³ Wang et al. and Collins et al. reported 90% and 83% closure of the air-bone gap in their study respectively.^{7,8} Malik et al achieved moderate improvement in the percentage closure of ABG in patients who had underwent canalplasty (approximately 4 dB difference).⁹ In the study conducted by Peng B et al, where a retrospective review was performed on 56 patients who had undergone a canalplasty, it was found that all patients were doing well with no post-operative complications such as skin flap necrosis, external canal stenosis and cholesteatoma pearls.¹⁰

CONCLUSION:

The advantages of performing a canalplasty include:

1. Significant improvement in Air-Bone gap.
2. Excellent visualization and surgical access

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