

Original Research Article

A comparative study of hearing outcomes in canal wall up versus canal wall down mastoidectomy in our experience

Poornima S. Bhat, G. Gandhi*, K. Pradheep

Department of ENT, Sri Manakula Vinyagar Medical College and Hospital, Puducherry, India

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*Correspondence:

Dr. G. Gandhi,

E-mail: santhanakrishnan2709@gmail.com

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ABSTRACT

Background: COM causes considerable morbidity with ear discharge, conductive hearing loss and complications. Ossicular reconstruction is a surgical procedure which intends to improve the quality of hearing and life in such patients. Comparison of the outcomes will help to determine the merits or demerits of a particular procedure.

Methods: The study was conducted in the Department of ENT, VIMS, Bellary during the period from December 2010 to May 2012. All the patients with CSOM with ossicular erosion suggested by conductive hearing loss more than 40dB were included in the study. A detailed history taking, thorough clinical examination was done for these patients. Before and after the procedure pure tone audiometry was done to assess the hearing outcome. Post operatively PTA was done in 6th week, 3rd month, 6th month follow up. Hearing improvement was analysed according to the type of procedure. The data collected was tabulated and subjected to statistical analysis.

Results: This study compared the outcomes of hearing gain in canal wall up versus canal wall down mastoidectomy surgeries. Hearing gain was better in canal wall up mastoidectomy (18.36 dB) than canal wall down mastoidectomy surgeries.

Conclusions: Hearing outcome was better in intact canal wall mastoidectomy than canal wall down mastoidectomy in our study.

Keywords: Chronic suppurative otitis media, Canal wall up mastoidectomy, Canal wall down mastoidectomy

INTRODUCTION

Chronic suppurative Otitis media is typically a persistent, potentially dangerous disease often capable of causing severe destruction and irreversible sequelae such as fatal intracranial complications leading to undue burden on the patient, family and society.¹

CSOM and associated hearing loss is significant in our society and an effort directed towards the assistance of those who are afflicted is indeed worthwhile. The consistent achievement of good hearing results in the presence of CSOM is still one of most difficult challenges of otologic surgery, so many great otologist

innovated and improved the quality of surgery and results.^{2,3}

Modified radical mastoidectomy (MRM) provides relatively safe surgical access for the removal of chronic middle ear and mastoid disease and gives reproducible results. However, it had been suggested that hearing may not be as good as that after "intact canal wall mastoidectomy" (ICWM).^{4,5}

This study was done to compare hearing outcomes between canal walls up versus canal wall down mastoidectomy surgeries.

METHODS

Source of data

Patients attending the Department of ENT, VIMS, Bellary during the period from December 2010-May 2012.

Materials

Materials used in the study autologous temporalis fascia, autologous ossicles.

All the patients presenting with chronic suppurative otitis media with ossicular erosion were evaluated and advised for surgery. Patients with sensorineural hearing loss, complications of CSOM were excluded from the study.

A written informed consent was taken from all the patients included in the study. A detailed history taking, thorough clinical examination was done. Patients underwent routine blood investigations, otomicroscopic examination. In all patients, x ray mastoids schuller's view was taken. HRCT bilateral temporal bones was done in selected cases. Pure tone audiometry was done once before the surgery, then post operatively at 6th week, 3rd month and 6th month follow up..

Sample size

50 patients presenting with chronic suppurative otitis media

Sampling method

Simple random sampling.

Operative procedure

General anaesthesia along with local infiltration of 2% lignocaine with adrenaline was done endaurally and postaurally. Koerner's flap elevated. The temporalis fascia graft harvested using an post auricular incision, mastoidectomy was done based on the extent of disease tympanoplasty was done using autologous temporalis fascia and autologous ossicles.

Regular follow up was done every week for first 3 weeks, later at 6th week, 3rd month and 6th month. Patients were assessed for hearing improvement using PTA.

RESULTS

In this study, out of 50 patients, maximum number of patients 27 (54%) belonged to 15-25 years. Females were more in this study 30 (60%).

Right ear 28 (56%) was involved more than left ear, 13 (26%). Bilateral disease was seen in 9 (18%) patients.

Table 1: Showing age and sex distribution of the patients.

Age group (years)	Sex		Total
	Male (%)	Female (%)	
<15	04 (20.0)	04 (13.3)	08 (16)
15-25	11 (55.0)	16 (53.3)	27 (54)
26-35	02 (10.0)	06 (20.0)	08 (16)
>35	03 (15.0)	04 (13.3)	07 (14)
Total	20 (100)	30 (100)	50 (100)

Table 2: Showing laterality of the chronic suppurative otitis media in the patients.

Ear involved	Frequency	Percentage (%)
Right	28	56
Left	13	26
Bilateral	09	18
Total	50	100

In this study canal wall up mastoidectomy was done in 26 (52%) cases. 24 (48%) patients underwent canal wall down procedure.

Table 3: Showing the frequency of mastoidectomy procedures done in the patients.

Procedure	Frequency	Percentage (%)
Canal wall up mastoidectomy	26	52
Canal wall down mastoidectomy	24	48

In our study hearing gain in canal wall up mastoidectomy was 18.36 dB was more compared to canal wall down mastoidectomy 11.03 dB, p=0.001(significant).

Table 4: Showing the hearing gain at the end of 3rd month follow-up.

Procedure	Hearing gain	P value
Canal wall up mastoidectomy	18.36 dB	0.001 (significant)
Canal wall down mastoidectomy	11.03 dB	

DISCUSSION

Modern tympanoplasty began in 1950s as reported by Wullstein and Zollner.⁶

Brackman reviewed his personal cases of surgery for chronic otitis media over a 5-year period and studied 108 cases without prior surgery who required tympanoplasty with mastoidectomy for cholesteatoma.⁷ Thirty-two percent of the cases were in children 15 years of age and under. Over two thirds of the procedures were canal wall

up, and the remainder of patients underwent a canal wall down technique with obliteration. There was little difference in the results between children and adults, with the exception of there being a tendency for a greater degree of ossicular destruction in the children and a greater incidence of residual disease at second stage surgery. There was a 3 percent incidence of recurrent cholesteatoma. It appears that the intact canal wall technique is preferable in both children and adults, when circumstances are favorable.

In our study also, results of canal wall up mastoidectomy procedures gave comparable results to that of canal wall down mastoidectomies.

In a study by Glasscock, Out of a series of 590 chronic ear surgeries there were 179 done for cholesteatoma (30 percent).⁸ There were 153 patients, 26 of whom had bilateral disease. Twenty-three patients were lost to follow-up, giving an overall total of 154 surgeries with from one to five-year information. The overall follow-up rate was 85 percent. The authors felt that the intact canal wall tympanoplasty is a procedure that will gain acceptance and will be more widely used in the future.

In our study, right ear 28 (56%) was involved more than left ear, 13 (26%). Bilateral disease was seen in 9 (18%) patients. Given the optimal disease clearance, canal wall up procedures give better results than canal wall down procedures in terms of hearing outcomes.

Debate in the literature exists as to whether retention of the ear canal during mastoidectomy confers an intrinsic advantage when reconstructing the middle ear. This question has proven difficult to answer, as most otologists perform both procedures, with more extensive middle ear/mastoid disease resulting in a canal wall down procedure. In general, it is fair to conclude that the extent of the middle ear disease is a much more important predictor of hearing outcome than is the type of mastoidectomy performed.

According to a study by Cook et al study shows Modified radical mastoidectomy (MRM) provides relatively safe surgical access for the removal of chronic middle ear and mastoid disease and gives reproducible results.⁹ However, it had been suggested that hearing may not be as good as that after "intact canal wall mastoidectomy" (ICWM). This paper reviews 153 tertiary referrals suffering from extensive disease who underwent MRM and compares their hearing results with those obtained by other authors using ICWM and MRM and a variety of reconstructive techniques. Hearing results after MRM were found to be better after primary surgery than after revision and better in the presence of an intact stapes. There were no significant differences found between hearing results obtained by MRM in this series and other published results of canal wall down mastoidectomy and ICWM, irrespective of the use of ossicular replacement prostheses.

In a study by Lin et al, in auto-ossicular residue reposition group, 86.3% was satisfied 10 years postoperation.¹⁰ The satisfaction rate was 76.5% in homo-ossicle transplantation group; In the group of homo-chondroseptum graft, 77.4% of satisfaction rate was reached. Auto-ossicular residue reposition is a better choice for ossicular chain reconstruction. In our study, use of autologous ossicles have been used.

According to O'Reilly et al sculpted autologous or homologous incus interposition provides hearing success comparable with current allograft prosthesis studies, has a very low extrusion rate, and remains stable over time.¹¹ They were not able to demonstrate an association between the middle ear risk index and hearing results in this subset of patients.

In our study average hearing gain in canal wall up mastoidectomy was better 18.36 dB, than canal wall down mastoidectomy 11.03 dB. ANOVA test F value - 3.43, p=0.001 (significant).

A study by Sonkhya et al opined that their technique of Intact canal wall tympanomastoid surgery takes less time than the classic Jansen's technique, is easily reproducible and taught, is a single stage procedure and can be universally applied to various chronic middle ear pathologies as the primary treatment with low recidivism rate.¹²

Lasisi in his study, noted that hearing benefit from CWDT is minimal, a second look surgery and ossiculoplasty, bone – anchored hearing aid or a hearing aid may be expedient for further hearing augmentation.¹³ These results were comparable to our study.

Ulug in his study of transposed canal wall tympanomastoidectomy, concluded that, TCW technique provides improved intraoperative exposure of the key areas without creating a mastoid bowl, reduces the incidence of recidivism, and allows for hearing restoration by only transposing the canal walls circumferentially.¹⁴

In our study hearing gain in canal wall up mastoidectomy was 18.36 dB was more compared to canal wall down mastoidectomy 11.03 dB.

CONCLUSION

Hearing outcome was better in canal wall up mastoidectomy than canal wall down mastoidectomy in our study.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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