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Original Research Article

A Comparative Study of Postoperative Results of Patients Who Underwent Canal Wall Down Versus Canal Wall up Mastoidectomy

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Abstract:

Background: CSOM and accompanying hearing loss are significant in our society, and an effort to assist those afflicted is worthwhile. The selection of the technique remains debatable and relies on the presence or absence of cholesteatoma, its location, the state of the middle ear mucous membrane, and auditory thresholds

Method: A prospective analytical study carried out from October 2018 to June 2020 on patients attending the ENT outpatient department of a tertiary health care center.

Results: The mean age of patients was 27.84 ±10.62years & male-to-female ratio was 1.28:1. In Group I post-operative hearing improvement was seen among 26 (55.3%) patients. While in Group II, 13 (39.4%) of the patients had hearing improvement.

Conclusion: Patient satisfaction in term of dry ear, pain, & hearing improvement was found better in CWU than in CWD mastoidectomy. Also, disease control in terms of dry ear & hearing improvement post 6 months was found better in CWU than CWD.

Keywords: Canal Wall Down, Canal Wall Up, Comparison, CSOM.

Introduction

Chronic Suppurative Otitis media (CSOM) is typically a persistent, potentially hazardous illness often capable of causing severe destruction and irreversible sequel such as lethal intracranial complications leading to an undue burden on the patient, family, and society. [1] CSOM is characterized by epithelial accumulation with keratin production within the tympanic cavity. Cholesteatoma is classified as innate or non-inheritable and is categorized as primary or secondary cholesteatoma. [2] The selection of the technique remains debatable and relies on the presence or absence of cholesteatoma, its location, the state of the middle ear mucous membrane, and auditory thresholds. [3]

The surgical procedures aim not only to eradicate and remove the disease completely but also to provide a complication-free ear for the rest of life. [4] Canal wall down (CWD) and canal wall up (CWU) mastoidectomy characterize two surgical approaches to tympanum cleft pathology. [5]

Cholesteatoma can lead to subsequent bone destruction and other complications such as meningitis, brain abscess, labyrinthitis, and facial nerve paralysis. 7.6% and 57.0% were the recurrence rates reported after the surgery and were related to the length of follow-up. The only way to eradicate this cyst is via surgery, which aims to achieve a dry self-cleansing ear and completely eradicate the present disease. [6-8]

In our present study, our focus is on the surgical technique of CWD, CWU procedures, and outcomes of procedures in terms of persistent otorrhea, hearing outcome, postoperative complications, and recurrence of cholesteatoma.

Materials & Methods

The present study was a prospective analytical study carried out from October 2018 to June 2020 on patients attending the ENT outpatient department of a tertiary health care center. The study sample included all patients satisfying inclusion criteria in a given time. Informed consent was taken in the language that the patient understands. Each patient was subjected to a detailed examination of the ear and managed surgically. The necessary permission and approval from the Institutional Ethics Committee was taken prior to the start of study.

The diagnosis of CSOM: The atticoantral pathology with or without cholesteatoma or granulations was made on clinical grounds. The patients underwent examination protocol which included detailed history, complete Ear, Nose, Throat, and systemic examination, oto-microscopy, tuning fork tests, audiometry, and radiological investigations.

All cases between the age group 12 to 55 years of either sex complaining of CSOM with cholesteatoma, granulation tissue, glue ear, or EAC-polyp & whose ear was in the quiescent or dry stage were included in this study.

The cases with ASOM (acute suppurative otitis media), and patients complaining of CSOM with complications like facial nerve palsy, labyrinths, and intracranial complications were not included in the study. Also, patients with uncontrolled metabolic disorders like Diabetic mellitus, Hypertension, etc. patients with previous history of ear surgery, uncooperative patients, and patients with congenital ear disorders were excluded from this study.

A thorough general examination along with an ENT examination was carried out and basic tests like tuning fork test and Valsalva maneuver were performed. Patients with Postero-Superior Pocket & limited cholesteatoma were taken for Canal Wall Up procedures (Cortical, Atticotomy & Atticoantrostomy). Patients with Extensive Cholesteatoma were taken up for Canal wall-down procedures (Modified Radical Mastoidectomy) with tympanoplasty. Follow-up was done for six months post-operatively and the outcome was measured in terms of discharging ear, hearing status, presence of complications, recurrence, and waterproof ear. At the time of follow-up, the patient was evaluated by otoscopic examination, microscopic examination to determine the condition of the graft and pure tone audiometry was done to calculate the AB gap.

The collected data was entered in Microsoft Excel. The mean and standard deviation of quantitative variables were shown. Appropriate statistical tests were applied using the trial version of statistical software SPSS version 23. The chi-square test was used for the correlation between the qualitative & quantitative variables. Statistical significance is considered at p-value less than 0.05.

Results

The prospective analytical study was carried out in the Department of Otorhinolaryngology, at Tertiary care hospital in central India over 20 months from October 2018 – June 2020. The patients undergone canal wall up surgery were considered to be in Group-I while Group-II for those gone through canal wall down.

Table 1: Demographic details of study participants as per type of surgery

Category	Sub-category	Group-I (%)	Group- II (%)	Total (%)
Age Group	12-25	20 (42.6)	27 (57.4)	47 (100)
	26-40	16 (80)	04 (20)	20 (100)
	41-55	11 (84.6)	02 (15.4)	13 (100)
Gender	Male	27 (60)	18 (40)	45 (100)
	Female	20 (57.1)	15 (42.9)	35 (100)
Laterality	Right	24 (60)	16 (40)	40 (100)
	Left	17 (56.7)	13 (43.3)	30 (100)
	Bilateral	06 (60)	04 (40)	10 (100)

The study shows that the majority of the patients had canal wall-up surgery compared to canal wall-down.

Out of the total, 47 (58.8%) of the patients were in the age group 12-25 years followed by 26-40 years 20 (25%). The mean age of patients was 27.84 ±10.62years. In contrast, the majority of patients were male 45 (56.3%) while females were 35 (43.8%).

The male-to-female ratio was 1.28:1. The maximum of the patients had right-side ear involvement followed by left and then bilateral ear involvement.

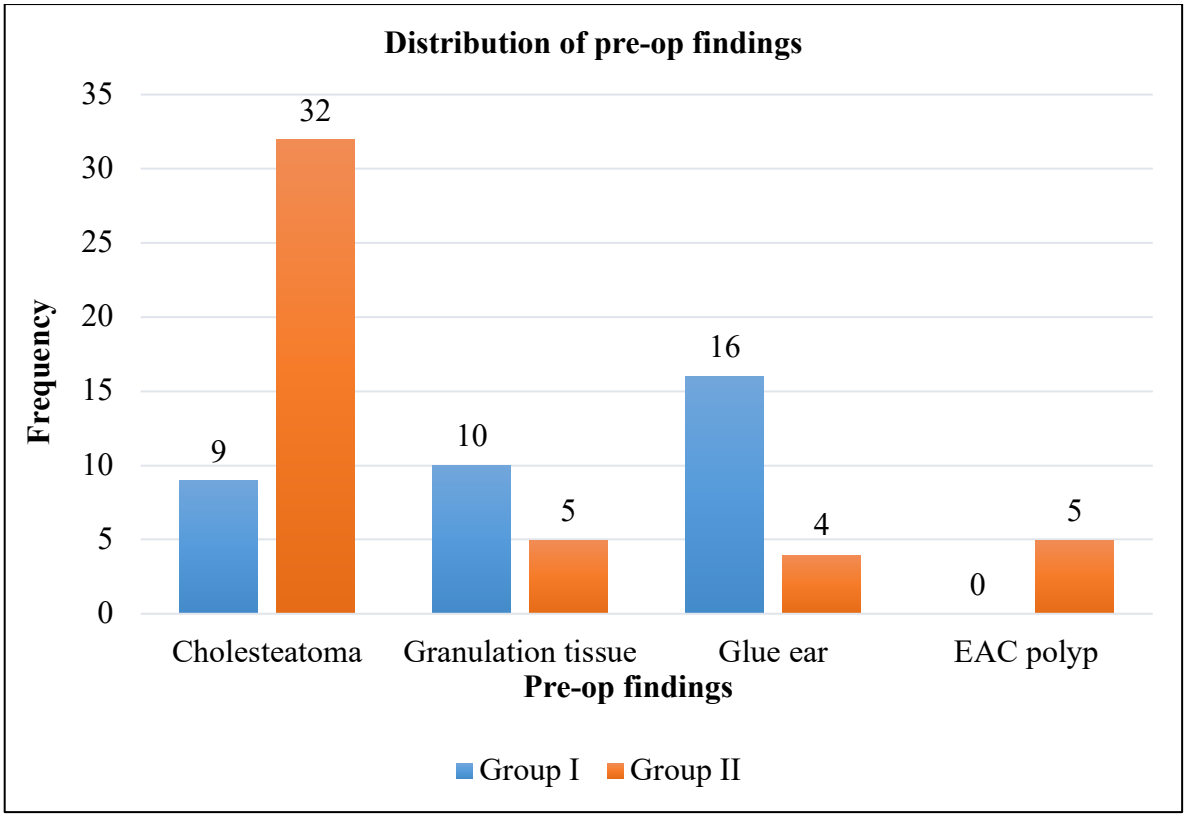

Figure 1: Distribution of pre-op findings as per type of surgery

The given study shows the distribution of patients according to the presence of preoperative findings.

Cholesteatoma was present in the majority of 32 (78%) patients of group II, along with granulation tissue (60%) & EAC polyp (100%). While glue ear was seen in the majority of the patients in group I. The relationship between the presence of preoperative findings and the type of surgery was found statistically highly significant. (p -value =0.0001).

Table 2: Distribution according to post-operative hearing improvement between study groups

Category	Group I (%)	Group II (%)	P-Value
Disease controlled	21 (44.7)	31 (93.9)	0.0001
Post-op hearing improvement	26 (55.3)	13 (39.4)	0.161
Post-op ear discharge	08 (17.0)	22 (66.6)	0.00001

In the given study, we have considered the comparison of disease control in terms of dry ear & hearing improvement post 6 months after canal wall up and canal wall down procedure.

It is controlled in 21 (44.7%) patients in group I and 31 (93.9%) patients in group II. The relationship between disease control after surgery and the type of surgery was found statistically highly significant. Out of the total of 47 patients in group I, a post-operative hearing improvement was seen among 26 (55.3%) patients. While out of 33 patients in Group II, 13 (39.4%) of the patients had hearing improvement. The post-operative discharge was found in 8 (17.0%) patients of Group I and 22 (66.6%) patients of Group II.

Thus, the relationship of disease control & recurrence after surgery with the type of surgery was found to be statistically highly significant. While it was not found significant with the post-op hearing improvement.

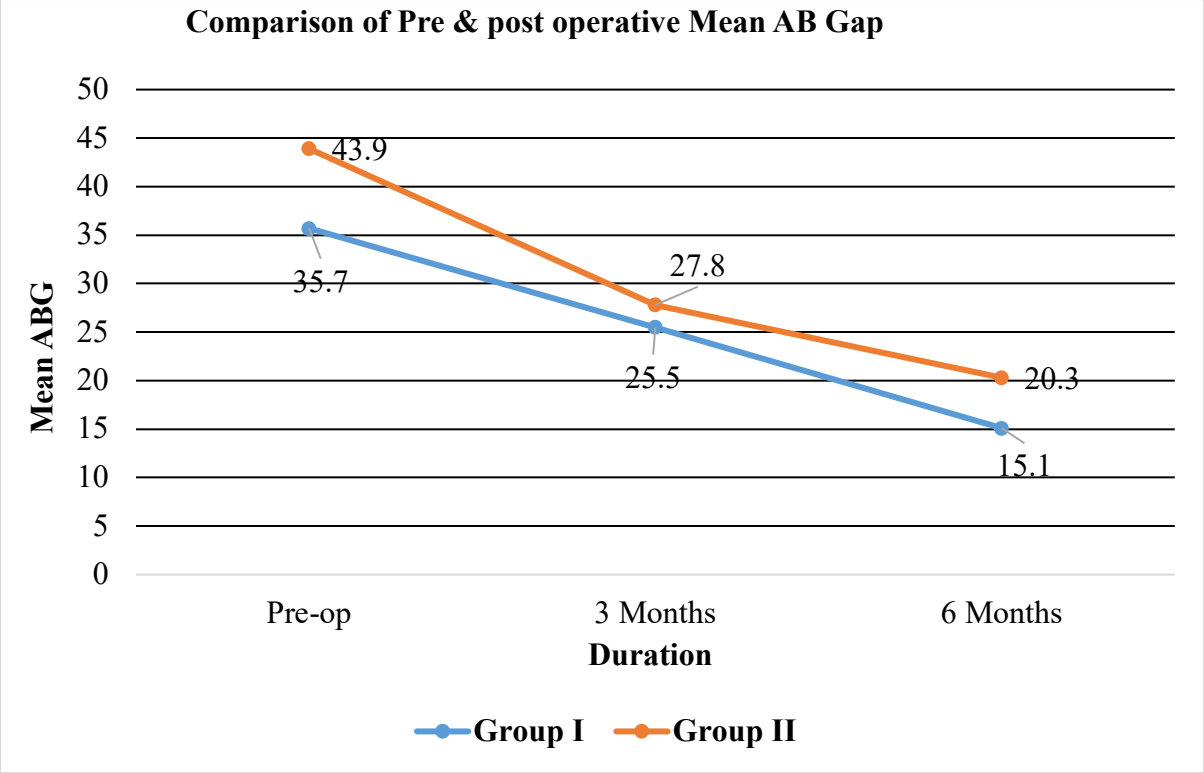

Figure 2: Comparison of Pre & post-operative Mean AB Gap

In this study, it was observed that the mean AB gap during pre-operative condition was 35.7dB in group I compared to 43.9dB in group II. While mean AB gap at Post-op 6 months was surprisingly found to be 15.1dB in canal wall up compared to 20.3dB in canal wall down.

Discussion

This prospective analytical study entitled "a comparative study of postoperative results of patients who underwent canal wall down versus canal wall up mastoidectomy" was carried out in the Department of Otorhinolaryngology, at Tertiary care centre. During this study period, a total number of 80 patients of CSOM, age above 12 years of either sex were studied. The patient's history recording, clinical examination along investigations was done. Each patient was subjected to a detailed examination of the ear and managed surgically.

In our study, the majority 47 (58.8%) of the patients were in the age group 12-25 years followed by 26-40 years 20 (25%) while only 13 (16.3%) were above 41 years. The mean age of patients was 27.84 ±10.62years. Similarly a study done by Bhat P. et al [1] found maximum number of patients 27 (54%) belonged to 15-25 years. Also, a study was done by Modak VB et al [9] found that, of the 106 patients, 87% belonged to the <20 years age group, while 53% belonged to the 10-20 years age group & 64% were males. 53% belonged to the age group 10–20 years with an M: F ratio of 1.8: 1. Azevedo AF et al [10] found average age 30 years (standard deviation, 15.17) with a minimum age of 14 and a maximum age of 78. The average period of postoperative follow-up of these patients was 7.5 years. While Siddiqui R et al. [11] found 70% were in the age group of 15-45 years. In the given study, the distribution of patients according to the type of surgery. Out of a total of the 80 patients, the majority of 47 (58.8%) of the patients were done with canal wall up while 33 (41.2%) patients with the canal wall down the type of surgery. Similarly Siddiqui R et al. [11] operated 20 cases with CWU procedure while the remaining 60 cases with CWD procedure. All the patients were followed up after three months and six months and was found that there was 15% and 30% recurrence for CWD and CWU procedure respectively. While Bhat P et al [1], Azevedo AF et al. [10], & Ajalloueyan M et al. [12] operated a nearly equal number of cases for both types of surgery.

The given study shows the distribution of patients according to the presence of a cholesteatoma. Cholesteatoma was present in 09 (22%) patients of group 1 and 32 patients of group 32 (78%). The relationship between the presence of cholesteatoma and the type of surgery was found statistically highly significant. (p -value <0.0001) Cholesteatoma was present in 233 (77.66%) patients & 67 (22.33%) had granulation tissue in the study conducted by Thapa N et al [13]. Also a study conducted by Yusof et al [14] found the presence of granulation tissue with cholesteatoma

in 57.9% of cases. While the study by Anant Chouhan et al [15] found that there was no sign of residual or recurrent cholesteatoma.

In this study, it was observed that the mean AB gap during pre-operative condition was 35.7dB in canal wall up compared to 43.9dB in canal wall down. While mean AB gap at Post-op 6 months was 15.1dB in canal wall up compared to 20.3dB in canal wall down. Yusof et al [14] found that 21.2 % of patients showed an improvement in the air-bone gap.

A study by Anant Chouhan et al [15] concluded that the pre-operative air-bone gap was 33.85 dB which was decreased to 23.4 dB and 22.1 dB post-operatively at 3rd month and 6th months respectively. Reduction in air-bone gap was recorded during the post-operative period. Similar results found in a study done by Hirsch et al. [16] demonstrated superior hearing outcomes in a CWUM (76% in CWU versus 69% in CWD with ABG closure less than 30 dB). Kim et al [17] found no significant difference in the postoperative air-bone gap (ABG) between CWU and CWD (10.9 vs. 13.5dB). Karamert et al [18] found that, postoperatively, the mean air conduction thresholds were significantly better in CWU compared to CWD surgeries (P = 0.016).

Sengupta A et al [19] found that audiometrically documentable hearing improvement occurred in 35% cases (p = 14), in rest of the ears hearing status remained unaltered. At the end of 6 months follow up 92.5% (p = 14) in rest (p = 37) operated ears become completely dry.

Conclusion

In the present study it was found that, the patient satisfaction in term of dry ear, pain, & hearing improvement was found better in CWU than CWD mastoidectomy. Also, disease control in terms of dry ear & hearing improvement post 6 months was found better in CWU than CWD.

The decision for CSOM treatment whether to do CWU or CWD surgery should be undertaken with caution. The patient will become a regular visitor to the OPD for a long term till the cavity is entirely trouble free and self-cleaning when CWD surgery is undertaken. Whereas patients with CWU mastoid required less cavity care, thus decreased doctor dependency, less frequent OPD visits, and the fewer courses of medical treatment, fewer burden on hospital resources, & less financial burden on the patient.

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