

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Study Of Assessment Of Quality Of Life In Patients After Mastoid Obliteration Surgery.

Chirag K Shah¹, Parmanand D Chawan^{2*}, and Pawar Sunil J³.

¹Registrar, Department of Otorhinolaryngology, New Thergaon Hospital, PCMC, Pune, Maharashtra, India.

^{2,3}Consultant, Department of Otorhinolaryngology, New Thergaon Hospital, PCMC, Pune, Maharashtra, India.

ABSTRACT

Surgical options for the cholesteatoma are mainly canal wall up mastoidectomy and canal wall down mastoidectomy depending upon the preservation of posterior canal wall. This Prospective Observational study has been conducted on 30 patients having squamosal chronic otitis media attending Out Patient Department of ENT. Cases of canal wall down mastoidectomy with mastoid cavity obliteration after their consent will be enrolled in the study and they will be followed up preoperatively and postoperatively (at end of 1st month, 2nd month and 3rd month) with a set of investigations and questionnaire to assess the benefits of mastoid cavity obliteration in canal wall down mastoidectomy cases. 20 (67%) out of 30 ears were having much better outcomes due to canal wall down mastoidectomy with mastoid obliteration surgery followed by 7 (23%) ears with better outcomes. 2 (7%) ears did not have a good outcome due to recurrence and 1 (3%) ear had a good outcome. Obliteration results in achieving faster healing and a dry cavity and gives good patient satisfaction post-operatively. Therefore, it is recommended to do mastoid obliteration after canal wall down mastoidectomy procedure, preferably with local muscle flap.

Keywords: Mastoid obliteration surgery, dry cavity, mastoidectomy

<https://doi.org/10.33887/rjpbcs/2023.14.2.23>

**Corresponding author*

INTRODUCTION

Surgical options for the cholesteatoma are mainly canal wall up mastoidectomy and canal wall down mastoidectomy depending upon the preservation of posterior canal wall. The choice of surgery has been a point of unending debate and the existence of vast literature in support of both types of surgeries makes it even more difficult to favour one type of surgery over the other [1]. Canal wall up mastoidectomy where the posterior canal wall is left intact though it preserves the anatomy of the middle ear, simplifies ossicular reconstruction and minimizes the post-operative morbidity, has high recurrence rates leading to failure of surgery and need of revision surgeries [2, 3].

Canal wall down mastoidectomy where the posterior canal wall is brought down is preferred in case of extensive cholesteatoma as it provides good exposure of hidden spots in temporal bone to which access in canal wall up mastoidectomy is hindered and so the chance of residual disease being left back is decreased [4, 5]. The drawbacks of canal wall down are associated with the persistent discharging mastoid bowl and are cause of lower levels of satisfaction amongst the patients who undergo the surgery. With this intention present study was planned to study of quality of life in patients after mastoid obliteration surgery.

MATERIAL AND METHODS

This Prospective Observational study has been conducted on 30 patients having squamosal chronic otitis media attending Out Patient Department of ENT. Cases of canal wall down mastoidectomy with mastoid cavity obliteration after their consent will be enrolled in the study and they will be followed up preoperatively and postoperatively (at end of 1st month, 2nd month and 3rd month) with a set of investigations and questionnaire to assess the benefits of mastoid cavity obliteration in canal wall down mastoidectomy cases.

Inclusion criteria

- Prospective cases of active squamosal chronic otitis media undergoing canal wall down mastoidectomy with obliteration.
- Active squamosal chronic otitis media undergoing canal wall down mastoidectomy cases in all genders
- Active squamosal chronic otitis media undergoing canal wall down mastoidectomy cases of all age groups.

Exclusion criteria

- Cases with intracranial complications and extracranial complications of active squamosal chronic otitis media
- During mastoidectomy if any complication or abnormality is detected
- Unwilling for study
- Patients who cannot keep follow up

The Glasgow Benefit Inventory (GBI) is a questionnaire consisting of 18 items. It was used as a measuring tool to quantify changes brought in the quality of life of patients. The questionnaire had in it 3 fields- general, physical, and social health, and thus consisted of three subscales. Of the 18 questions included, 12 deal with general health, 3 deal with physical health, and 3 deal with social health changes.

Every question had a scoring between 1 and 5, better results having a greater score, and so a total score can be calculated was anywhere between 18 to 90 points.

Since the GBI is scaled on an axis of -100 to +100, the maximum benefit achieved with obliteration is well reflected by scores of +50 and above, while moderate benefits range between +10 to +50.

RESULTS

Mean age of 30 study sample was 32.93 years (standard deviation – 14.01 years), with the oldest being 60 years and youngest being 11 years. There were 18 (60%) males and 12 (40%) female in the study while 11 (36.67%) samples were from 21-30 years age group followed by 6 (20%) subjects from 51-60 years age group.

Table 1: Whisker box plots showing post-operative GBI scores and their interpretation Statistics

		GBI Score	GBI Interpretation
N	Valid	30	30
Mean		77.83	66.38
Std. Deviation		11.169	30.604
Range		51	141.66
Minimum		39	-41.66
Maximum		90	100

Table 1 showing GBI scores and their interpretation

Taking into consideration the GBI scores calculated from Glasgow Benefit Inventory Questionnaire at the end 3rd month post-operatively, 28 ear cases reported a positive change in their quality of life. The highest score recorded was 90 and minimum recorded was 39. The mean of the GBI scores of all 30 ear cases was 77.83. On interpretation of GBI scores on segmental axis of -100 to +100, the highest score recorded was 100 and minimum score recorded was -41.66, the mean was 66.38, which signifies an overall much better outcome and an improvement in quality of life post-operatively.

Two ear cases recorded a negative score on interpretation of GBI scores on the segmental axis of -100 to +100, signifying that their outcome was not good and there was a negative impact on their quality of life post-operatively.

Distribution of cases as per outcome



Figure 1: Bar diagram showing distribution of outcomes amongst the study cases

Above pie chart shows that 20 (67%) out of 30 ears were having much better outcomes due to canal wall down mastoidectomy with mastoid obliteration surgery followed by 7 (23%) ears with better outcomes. 2 (7%) ears did not have a good outcome due to recurrence and 1 (3%) ear had a good outcome.

Table 2: Whisker box plot showing AB gaps at monthly follow-ups

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair	Post-operative - 1 month	13.133	9.164	1.673	9.711	16.555	7.850	29	0.000
	Post-operative - 2 month	13.067	9.070	1.656	9.680	16.454	7.890	29	0.000
	Post-operative - 3 month	13.167	8.158	1.489	10.120	16.213	8.840	29	0.000

Mean postoperative air bone gap after 3 month (17.07±11.37) was lower than preoperative air bone gap (30.23±10.05) and difference was statistically significant (p=0.000).

DISCUSSION

A well planned and executed primary canal wall down mastoidectomy procedure with mastoid obliteration gives excellent results in terms of removal of total disease and patient satisfaction in terms of dry ear, self-cleaning cavity and no restriction from water activities and least chance of calorically induced vertigo due to water and air exposure. For the purpose of mastoid obliteration many synthetic materials including metals, bioactive glass, calcium phosphate, ceramic granules, demineralized bones and others materials can be used but the cost of these materials being high and literature being limited for these techniques local flaps and grafts are a better option which have been used by many surgeons throughout the world [6, 7]. And taking above factors into consideration a decision was made to use local flaps and cartilage for the mastoid obliteration purpose in our study.

27 (90%) out of 30 ear cases were not having any comorbid condition while the remaining 2 (7%) ear cases suffered from diabetes along with hypertension and 1 (3%) ear case suffered hypertension. In the case of diabetes initial barrier to the healing process is the increased blood glucose level, which leads to the cell wall rigidity, impaired flow of blood through the critical small vessels at the wound site and jeopardized red blood cell permeability and flow which altogether compromise with success of surgery [8]. In study reported by Guo S et al, stated that amongst various factors which can impact and hamper wound healing hypertension is a significant factor [9].

In our study, we found that malleus (16 subjects) & incus (22 subjects) bones were mainly eroded while stapes was normal (23 subjects) among study ear cases undergoing surgery. In the study reported by Karamert et al. the stapes was found to be intact in 45 (59%) of the ear cases and stapes superstructure erosion was found which was addressed to improve hearing with a total ossicular chain reconstruction in 31 (41%) of the ear cases. Autografts (incus, malleus, or cortical bone) were put to use for ossicular reconstruction in 56 (73.6%) of the patients. Stapes suprastructure is contemplated to play a crucial role in hearing restoration and thus better hearing results as well [10].

The graft uptake was good from the second month to the end of the third month in our study. The graft was in the healing stage in the first month while in 2 ear cases there was failure of uptake of graft at end of three months due to recurrence.

In a study by Alam et al. canal wall down mastoidectomy group showed graft take-up in 22(39.28%) cases. In canal wall down mastoidectomy procedure, there is delayed healing of the mastoid cavity which in turn can act as a reservoir for infection and thus may affect the chances of graft uptake [11]. In a study reported by Kim et al the author explains that obliteration of mastoid cavity leads to a decrease in the size of the resultant mastoid cavity, thereby leaving a comparatively smaller surface area for epithelization resulting in eventual fast healing of the operated mastoid cavity. Bone covered up by obliterating material has a lesser chance of granulation as well as discharge in comparison with a non-obliterated mastoid cavity [12].

In our study epithelization was the most common finding following surgery, discharge was observed in 12 ear cases at one month reduced to 2 ear cases after three months. No ear case was having complaint of giddiness after canal wall down mastoidectomy with mastoid obliteration. Kim et al studied the outcomes and sequences of mastoid obliteration procedure with conchal cartilage and all the operated patients had complete epithelization and no disease recurrence. Also, retraction pockets were found only in 3 patients (10%) with wax and debris in 6 patients (20%). Hence it is concluded that mastoid obliteration by conchal cartilage is a very effective method to prevent problems resulting from cavity formation after canal wall down mastoidectomy.

In our study mean postoperative air-bone gap after 3 month (17.07+11.37) was lower than preoperative air bone gap (30.23+10.05) and difference was statistically significant ($p=0.000$). 105 20 (67%) out of 30 ear cases were having much better outcomes after canal wall down mastoidectomy with mastoid obliteration surgery followed by 7 (23%) ear cases with better outcomes. 2 (7%) ear cases did not have a good outcome due to recurrence and 1 (3%) ear case had a good outcome. The outcomes were concluded after thorough otomicroscopic examination and regular monthly Pure Tone Audiometry post-operatively at regular monthly intervals and with a pretested GBI questionnaire which the patient had to answer.

Ghiasi S. et al, reported in their study the usefulness of mastoid cavity obliteration with Palva flap after canal wall down mastoidectomy, the authors found that forty-six (82%) operated ears maintained a very small, healthy and dry mastoid cavity. Seven (13%) operated ears had occasional otorrhea, and three (5%) operated ears had showed small granulation tissue. Seven (12.5%) operated ears suffered residual cholesteatoma in the middle ear at second-look exploration surgery. Four (7%) operated ears suffered wound infection. From the study, he came to the conclusion that canal wall down mastoidectomy procedure with mastoid cavity obliteration with Palva flap is a very effective option for complete removal of cholesteatoma and to deal with postoperative mastoid cavity bowl problems [3].

Our study has attempted to assess quality of life and surgical outcome in canal wall down mastoidectomy with mastoid obliteration. For the purpose of mastoid obliteration, we used temporalis muscle flap and cartilage harvested from concha. Taking into consideration the GBI scoring at the end of 3rd month post-operatively, 28 ears (93.33%) out of the total 30 ears had a positive impact on quality of life, with the interpretation of scores showing an overall 'much better' outcome after surgery.

CONCLUSION

Obliteration results in achieving faster healing and a dry cavity and gives good patient satisfaction post-operatively. Therefore, it is recommended to do mastoid obliteration after canal wall down mastoidectomy procedure, preferably with local muscle flap.

REFERENCES

- [1] Dornhoffer JL (2004) Retrograde mastoidectomy with canal wall reconstruction: a follow-up report. *Otol Neurotol* 25(5):653-660.
- [2] Azevedo A Soares A Garchet H Sousa N. Tympanomastoidectomy: Comparison between canal wall-down and canal wall-up techniques in surgery for chronic otitis media. *International Archives of Otorhinolaryngology*. 2013;17:242.
- [3] Ghiasi S. Mastoid Cavity Obliteration with Combined Palva Flap and Bone Pâté. *Iran J Otorhinolaryngol*. 2015;27(78):23-8
- [4] Roberson J B Jr, Mason T P, Stidham K R. Mastoid obliteration: autogenous cranial bone pate reconstruction. *Otol Neurotol*. 2003;24(2):132-140
- [5] Mehta R P, Harris J P. Mastoid obliteration. *Otolaryngol Clin North Am*. 2006;39(6):1129-1142.
- [6] Schubl SD, Klein TR, Robitsek RJ, et al. Temporal bone fracture: evaluation in the era of modern computed tomography. *Injury*. 2016 Sep. 47 (9):1893-7.
- [7] Hippocrates (1935) *De Carnibus*. [in German and Greek]. Translated by Teubren BB. Leipzig, Berlin
- [8] Ekmektzoglou KA, Zografos GC. A concomitant review of the effects of diabetes mellitus and hypothyroidism in wound healing. *World J Gastroenterol*. 2006 May 7;12(17):2721-9. doi: 10.3748/wjg.v12.i17.2721. PMID: 16718759; PMCID: PMC4130981.

- [9] Guo S, Dipietro LA. Factors affecting wound healing. *J Dent Res*. 2010;89(3):219-229. doi:10.1177/0022034509359125
- [10] Karamert R, Eravcı FC, Cebeci S, et al. Canal wall down versus canal wall up surgeries in the treatment of middle ear cholesteatoma. *Turk J Med Sci*. 2019;49(5):1426-1432. Published 2019 Oct 24. doi:10.3906/sag-1904-109
- [11] Alam, Mehtab & Chandra, Kamlesh. (2021). Ears with Cholesteatoma: Outcomes of Canal Wall Up and Down Tympano-Mastoidectomies—A Comparative Prospective Study. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 10.1007/s12070-021-02549-1.
- [12] Deshmukh S, Sharma A, Dabholkar J. Mastoid cavity obliteration: Our experience. *Otolaryngologia Polska*. 2012;66(6):379-81.