

A prospective study on the clinical outcomes of scutumplasty in cases of attic cholesteatoma**B. Durga Prasad¹, Raju Naik Ajmeera^{2*}**¹Associate Professor, Department of ENT, Santhiram Medical College and General Hospital, Nandyal, Andhra Pradesh, India²ENT Consultant, Jawaharlal Institute of Postgraduate Medical Education and Research, Warangal, Telangana, India

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Abstract

Introduction: Cholesteatoma is a cystic lesion formed from keratinising stratified squamous epithelium, the matrix of which is composed of epithelium that rests on a stroma of varying thickness, the perimatrix. The resulting hyperkeratosis and shedding of keratin debris usually results in a cystic mass with a surrounding inflammatory reaction. Prussac's space is the site of origin of acquired cholesteatoma. It can later spread into mastoid cavity and mesotympanum and destroy the ossicles and induce complications. **Materials and Methods:** This was a prospective interventional study which was done in the Department of ENT, Santhiram Medical College and General Hospital, Nandyal from January 2017 to December 2019. 100 cases (48 males, 52 females) with attic cholesteatoma with eroded scutum were enrolled in the study and scutumplasty was performed after history taking and thorough clinical (Local & systemic) examination. Surgery was conducted in strict aseptic environment. **Results:** The mean preoperative and postoperative air-bone gaps were 36.8±14.8 dB and 27.1±11 dB, respectively (p=0.01) and the mean preoperative and postoperative high-tone bone conduction levels were 14.5±9.7 dB and 15.23±14.0 dB, respectively (p=0.411). Postoperative retraction occurred in 16% of patients and recurrent cholesteatoma was detected in 3 cases (6%) for which revision surgery was performed. **Conclusion:** Scutumplasty showed a low disease recurrence rate and no deterioration in hearing levels. With intact malleus head or body of incus, attic reconstruction was possible and this procedure lead to improved hearing. However, a problem that still needs to be addressed in future is postoperative retraction.

Keywords: Cholesteatoma, Ossicles, Scutumplasty, postoperative retraction

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Introduction

Cholesteatoma is a cystic lesion formed from keratinising stratified squamous epithelium, the matrix of which is composed of epithelium that rests on a stroma of varying thickness, the perimatrix. The resulting hyperkeratosis and shedding of keratin debris usually results in a cystic mass with a surrounding inflammatory reaction. Prussac's space is the site of origin of acquired cholesteatoma[1]. It can later spread into mastoid cavity and mesotympanum and destroy the ossicles and induce complications. The attic or epitympanum is bounded laterally by the scutum which is the superior wall of bony external auditory canal. Scutum is the first bony structure to be involved in the process of cholesteatoma spread. In initial stages, cholesteatoma will be limited only to attic[2].

In surgeries for attic cholesteatoma, the main goal is complete removal of cholesteatoma with prevention of residual and recurrent disease followed by restoration of hearing. Canal wall up and canal wall down mastoidectomy are the two main surgical techniques used. In canal wall up procedure the posterior canal wall is maintained whereas in canal wall down it is removed. In canal wall up procedure, relapse rate was found to be high[3]. The canal wall down procedure gives a wide exposure, so the eradication of disease is possible with reduced recurrence rate. Canal wall down is associated with post operative otorrhea and involved with the need of regular cavity cleaning.

Various factors are used to decide the type of surgery needed in a particular patient. Main factors are extent of disease, status of the opposite ear, Eustachian tube function, hearing status of the ear, complications, possibility for follow up and preference of surgeon[4]. Since a considerable number of patients with attic cholesteatoma attended the otorhinolaryngology services of our hospital, it seemed feasible as well as necessary to conduct this study in detail through clinical presentation, radiological assessment, surgical findings and their respective follow-up in the post-operative period[5].

We aimed to investigate the clinical results of scutumplasty in patients with an attic cholesteatoma and assess the pre & post-operative air bone gap.

Materials and methods

This was a prospective interventional study which was done in the Department of ENT, Santhiram Medical College and General Hospital, Nandyal from January 2017 to December 2019. 100 cases (48 males, 52 females) with attic cholesteatoma with eroded scutum were enrolled in the study and scutumplasty was performed after history taking and thorough clinical (Local & systemic) examination. Surgery was conducted in strict aseptic environment.

Surgical outcomes were evaluated in terms of relief from ear discharge, tinnitus, post-operative hearing improvement, air-bone gap and post-operative retraction pocket formation on a follow up of 3 months, 6 months and 12 months.

Inclusion Criteria

1. Cases of Unsafe Chronic Suppurative Otitis Media (CSOM)
2. Cases with Cholesteatoma limited to the attic as demonstrated by radiological findings.

Exclusion Criteria

1. Cases of adhesion and retraction in pars tensa.
2. Cases of safe chronic suppurative otitis media.

*Correspondence

Dr. Raju Naik Ajmeera

ENT Consultant, Jawaharlal Institute of Postgraduate Medical Education and Research, Warangal, Telangana, India

E-mail: Mail2raju2k2a@gmail.com

- 3. Cases of malignancy of external auditory meatus
- 4. Cases in immunocompromised state.
- 5. Patients unfit for general anaesthesia.
- 6. Patient aged < 7 years and > 55 years

Informed Consent

From patients was duly taken.

Study Design

Prospective interventional study.

Statistical Analysis

Data was evaluated using SPSS version 23. Descriptive statistics was used for data analysis using indexes like mean and standard deviation.

Frequency tabulation was done for nominal data. Pearson correlation test and t test were applied to compare pre and post-op data. Statistical significance was taken with p value ≤ 0.05 .

Results

The mean preoperative and postoperative air-bone gaps were 36.8 ± 14.8 dB and 27.1 ± 11 dB, respectively ($p=0.01$) and the mean preoperative and postoperative high-tone bone conduction levels were 14.5 ± 9.7 dB and 15.23 ± 14.0 dB, respectively ($p=0.411$). Postoperative retraction occurred in 16% of patients and recurrent cholesteatoma was detected in 3 cases (6%) for which revision surgery was performed.

Table 1: Age distribution

S.No	Age	No of patients
1	6-15	18
2	16-25	44
3	26-35	14
4	36-45	08
5	46-55	16

Table 2: Descriptive Stat (Pre & Post-Op Hearing Loss, Age)

	N	Minimum (dB)	Maximum (dB)	Mean	\pm SD
Pre-OP hearing loss	100	54	90	36.00	5.159
Post-OP hearing loss	100	34	74	27.18	5.491
Age (yrs.)	100	16	108	26.56	12.701

Table 3: Frequency Table for Gender, Pre-Op Otorrhoea, Pre-Tinnitus, Pre-Op Attic Cholesteatoma, Pre-Op Retraction Pocket

Parameters		Frequency	Percentage
Gender	Female	52	52
	Male	48	48
Pre-OP Otorrhea	No (0)	52	52
	Yes (1)	48	48
Pre-OP Tinnitus	No (0)	88	88
	Yes (1)	12	12
Pre-op attic Cholesteatoma	Yes (1)	100	100
	No (0)	0	0
Pre-op retraction pocket	Yes (1)	100	100
	No (0)	0	0
Pre-op scutum defect	Yes (1)	100	100
	No (0)	0	0
Post-op Otorrhea	Yes (1)	10	10
	No (0)	90	90
Post-op Tinnitus	Yes (1)	0	0
	No (0)	100	100
Post-op attic Cholesteatoma	Yes (1)	6	6
	No (0)	94	94
Post-op Retraction pocket	Yes (1)	16	16
	No (0)	84	84
Recurrence 3 months follow-up	Yes (1)	2	2
	No (0)	98	98
Recurrence 6 months follow up	Yes (1)	10	10
	No (0)	90	90
Recurrence 12 months follow up	Yes (1)	14	14
	No (0)	86	86

Table 4: Comparison of Pre & Post-Operative Clinical Outcomes

	Post-Pre Otorrhea	Post-and Pre- Hearing Loss	Post -Pre Tinnitus	Post-Pre Attic Cholesteatoma	Post-and Pre- Retraction Pocket
P Value	.000	.000	.014	.000	.000

Discussion

In our study, scutum reconstruction was done using mastoid cortical bone graft and conchal cartilage. Preoperative hearing reflected the mean air bone gap of 36 ± 5.15 dB and postoperative mean air bone gap of 27 ± 5.49 dB thus showing an improvement by 7-10 dB which was a significant improvement ($p \leq 0.05$). (Table 2). Other clinical outcomes like tinnitus, otorrhoea, attic cholesteatoma and retraction pockets were significantly reduced (Table 4). About 94 % of patients

had improvement in hearing. 90% had no problem of recurrence of otorrhoea. No regular follow-up was required in 86% of patients. Though post-operative recurrence after 12 months of follow up was there but was on the lower side (14%)[6]. Retraction pockets, which were present in all patients pre-operatively reduced to mere 16% (n=8) post operatively. Hence there was a significant clinical improvement post operatively barring 16% cases who had a recurrence in retraction pockets[7].

Alternate graft materials too were used in studies to study their effective/protective role, if any. When Shao Y et al. approached using cartilage and temporal fascia, it seemed helpful in reducing retraction of pars flaccida membrana tympani and with regard to the lesion limited to the attic, removal should be attempted by epitympanotomy through retroauricular incision. This way, the cartilage support helped in epitympanic aeration thus maintaining the fundamental shape of lateral attic. Although as per Omran A et al[8]. Glass Ionomer Bone Cement (GIBC) could be used as a reliable artificial material for lateral attic wall reconstruction after trans meatal atticotomy in Intact Canal Wall Mastoidectomy, thus decreasing cavity problems of canal down mastoidectomy especially in children. E Koury et al.[16] when used conchal cartilage with an additional piece of conchal cartilage to buttress the reconstruction, similar to our choice of graft material and found that, it led to low failure rate (13%) of attic reconstruction and residual disease (keratin pearl) in just 6% cases[9].

Similar to our study, Uyar et al. reported a low rate of recurrence (4.8%) of cholesteatoma among 83 patients who were treated with attic antrotomy with scutumplasty and Hinohira et al. reported that recurrence of post-op retraction pockets was statistically reduced on using bone pate scutumplasty. This technique also reduced the incidence of attic retraction pockets. Similarly, A.G. Pfeleiderer et al. also concluded the same when using combined approach tympanoplasty. On the contrary, Kiyofumi Gyo et al. study failed in scutumplasty but was attributed to dislocation and atrophy of graft material, together with bone resorption around bone defect. Also, dysfunction of eustachian tube and traction of ear drum by the scar tissue behind it, may also lead to attic retraction. They also emphasized that mastoid obliteration with small blocks of hydroxy apatite was more effective in prevention of retraction troubles than that with pedicled temporalis muscle flap[10].

Conclusion

Our study safely inferred that scutumplasty because of its ability to show significant post-operative improvements with nil cavity problems, could be labelled as a gold standard treatment. Even regular follow up for cavity cleaning was not required. Hence ear was free from discharge or residual disease. Recurrence of disease also seemed rare. Seeing the technique's advantage to avert complications such as postoperative cavity problems, hearing impairment, scutumplasty

seems the treatment of choice for attic cholesteatoma barring cases who had a recurrence in retraction pockets, a problem that needs to be addressed in the future with an alternate option.

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