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HEARING OUTCOME AFTER CANAL WALL UP & CANAL WALL DOWN MASTOIDECTOMY

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Abstract :

Background: The aim of this study is to compare the hearing outcome of canal wall up and canal wall down mastoidectomy .

Method: This study was a comparative prospective study carried out in the department of otorhinolaryngology.

Results & conclusion : Hearing results in CWU mastoidectomy were better than in CWD mastoidectomy. Hearing gain in CWU mastoidectomy and CWD mastoidectomy at 8 wks was 6.45 dB and 6.1 dB, at 14 wks was 24.48 dB and 11.24 dB, thus concluding that the hearing results in CWU mastoidectomy is better than in CWD mastoidectomy.

Keywords: Chronic Otitis Media,PureTone Audiometry,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) Squamosal type of CSOM is intrinsically associated with cholesteatoma. A unifying definition of the term “cholesteatoma” is a three dimensional epidermal & connective tissue structure usually in form of a sac & frequently confining to the architecture of the various spaces of the middle ear, attic, & mastoid. This structure has the capacity for progressive & independent growth at the expense of underlying bone & has a tendency of recurrence after removal.(2) Three factors appear to be involved in the process of bony resorption: (a) mechanical, related to pressure generated by the expansion of cholesteatoma (b) biochemical, due to bacterial elements (endotoxins), products of the host's granulation tissue (collagenase, acid hydrolases), and substances related to the cholesteatoma itself (growth factors, cytokines); and (c) cellular, predominantly induced by osteoclastic activity.(3) 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.(4) Modified radical mastoidectomy (MRM) provides relatively safe surgical access for the removal of chronic middle ear and

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mastoid disease and gives reproducible results.(5) This study was done to compare hearing outcomes between canal walls up versus canal wall down mastoidectomy surgeries.

MATERIAL & METHOD : All the patients with chronic otits media (active squamous disease) presenting with discharging ear & decreased hearing during the period of May2025 to April 2026 in otorhinolaryngology department evaluated for surgery under general anaesthesia & patients fit for general anaesthesia selected for both the procedures(canal wall up & canal wall down) on the random basis (double blind). Materials used in the study autologous temporalis fascia, autologous ossicles. All the patients presenting with chronic suppurative otitis media with ossicular erosion & cholesteatoma 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 8th week, 14 week and follow up. Sample size 70 patients presenting with chronic suppurative otitis media. Sampling method was Simple random sampling. In Operative procedure General anaesthesia along with local infilteration of 2% lignocaine with adrenaline was done endaurally and postaurally. 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.

ISSN: 0975-3583,0976-2833 VOL 17, ISSUE 5, 2026

RESULTS:

Table 1- Distribution of study subjects according to Age.

Age Group	Surgery				Total
	CWD		CWU		
	No.	%	No	%	
≤10 years	8	11.4	5	7.14	13
10– 40 years	24	34.28	24	34.28	48
>40 years	3	4.28	6	8.57	9
Total	35	50.0	35	50.0	70

Most of the patients are in the age group (8 to 40) years (68.5 percent). Minimum age was 8 years whereas the maximum being 56 years.

2.Comparison of mean PTA (pre-operative and post operative) among CWD group shows that mean PTA was higher pre operatively but it decreased at 8 weeks and further at 14 weeks and but only the difference at 14 weeks was found to be statistically significant.

TABLE -2

PTA	CWD		p Value
	Mean	SD	
Pre op	48.84	7.80	0.06
at 6 weak	47.34	8.05	
Pre op	48.84	7.82	0.007
at 12 weak	43.76	10.85	

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3.Comparison of mean PTA pre-operative and post operative among CWU group shows that mean PTA was higher pre operatively but it decreased at 8 weeks and further decreased at 14 weeks; this was found to be statistically significant.

TABLE -3

PTA	CWU		p Value
	Mean	SD	
Pre op	52.92	6.40	0.001
at 6 weak	47.96	6.37	
Pre op	52.92	6.40	0.001
at 12 weak	41.28	8.67	

4. Comparison of PTA among two surgery group

shows that mean PTA was significantly higher in CWU group as compared to CWD. PTA at 8 weeks post op was higher in CWU group but at 14 weeks it was higher in CWD group but both this difference was not found to be statistically significant.

TABLE -4

PTA	Surgery				p Value
	CWD		CWU		
	Mean	SD	Mean	SD	
Pre op	48.84	7.80	52.92	6.40	0.02
at 6 weak	47.34	8.03	47.96	6.37	0.72
at 12 weak	43.76	10.85	41.26	8.65	0.29

ISSN: 0975-3583,0976-2833 VOL 17, ISSUE 5, 2026

4.Hearing results at postoperative (8 weeks)

Hearing improvement is more in CWU group (85.60%) comparative to CWD group (62.70 %) at 8 wk postoperative PTA

TABLE -5

Hearing improvement (db)	CWU	%	CWD	%
<10	25	71.3	20	57.0
10 to 20	5	14.3	2	5.70
20 to 30	0	0	0	0
Total	30	85.60	22	62.70

6.Hearing results at postoperative (14 weeks)

Hearing improvement is more in CWU group (88.52 %) comparative to CWD group (65.66%) in postoperative 14 weeks PTA

TABLE-6

Hearing improvement (db)	CWU	%	CWD	%
<10	12	34.28	10	28.55
10 to 20	11	31.40	10	28.56
20 to 30	8	22.84	3	8.55
Total	31	88.52	23	65.66

DISCUSSION : This study was undertaken with the objective of comparing the results of canal wall up & canal wall down mastoidectomy .In our study, maximum patients attending

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outpatient department for surgical treatment for chronic otitis media were predominantly in the 10-40 year age group. These findings were in fair agreement with those reported earlier by Salman et al in the year 2005 with most common age group 16-30 years. The early presentation may be due to increased awareness in general population for health issues and the disease affecting their work efficiency leading patients to seek early medical intervention. Lasini and O. Afolabi in their study found the majority of the patients were young aged 21-34 years.

In canal wall up mastoidectomy patients at 8 wks postoperative period (85.60 %) patients & at 14 wks postoperatively(88.52%)patients had hearing improvement. (2.85%) patients had same hearing & (8.57%) patients had deterioration of hearing. With regards to post operative improvement of hearing p value is found to be .001 at(8 wks & 14 wks) which is <0.05 and is found to be significant.In CWU group at postoperative 8 wks 25 patients (71.3 %) had hearing improvement less then 10 db.5 patients (14.3 %) had hearing improvement 10-20 db. At postoperative 14 wks , 12 patients (34.28 %) had hearing improvement less then 10 db;11 patients (31.40 %) had hearing improvement 10-20 db & 8 patients (22.84 %) had hearing improvement 20-30 db. Average hearing gain in CWU mastoidectomy at 8wks is 6.45db & at 14 wks is 24.48 db.

In canal wall down mastoidectomy patients at 8 wks postoperative period (62.70%) patients & at 14 wks postoperatively (65.66) % patients had hearing improvement .(2.85%) patients had same hearing & (31.42%) % patients had deterioration of hearing. p value at 14 wks 0.007 which is <0.05 and was found to be statistically significant . CWD group at postoperative 8 wks 20 patients (57.12%) had hearing improvement less then 10 db.2 patients (5.710%) had hearing improvement 10-20 db. At postoperative 14 wks 10 patients (28.55%) had hearing improvement less then 10 db.10 patients (28.56%) had hearing improvement 10-20 db.3 patients (8.55 %) had hearing improvement 20-30 db. Average hearing gain in CWD mastoidectomy at 8 wks was 6.1 db & at 14 wks was 11.24 db.

By Chi-Square test,

With regards to post operative improvement of hearing in both groups of patients, p value is found to be <0.05 and is found to be significant; proving that canal wall up mastoidectomy has better hearing outcome then canal wall down procedure.

Similar to our results **Tos et al**(6) prefer canal wall up mastoidectomy as hearing threshold are worse after canal wall down mastoidectomy. Similar results to our study were present in study

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done by **Bhat S. et al** .(7)They conducted 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.**Osborn et al** (8) concluded that ICW patients had better postoperative hearing as that of our study (median AB gap, 38 dB vs 51 dB, P = .004) and greater hearing improvement (median hearing gain, 7 dB vs 0 dB, P = .004) than the CWD group;

CONCLUSION: Hearing gain in CWU mastoidectomy and CWD mastoidectomy at 8 wks was 6.45 dB and 6.1dB, at 14 wks was 24.48 dB and 11.24 dB, thus concluding that the hearing results in CWU mastoidectomy is better than in CWD mastoidectomy.

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