

# Surgical outcome of mastoid cavity obliteration with postauricular soft tissue in canal wall down mastoidectomy

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## Abstract

**Introduction:** A consensus is emerging amongst otologists that obliteration of the mastoid cavity that results after canal wall down mastoidectomy is a sound option to prevent cavity-related problems such as infection, otorrhea, granulation tissue, and hearing loss.

**Aim:** To evaluate the surgical outcome of patients undergoing obliteration of mastoid cavity with postauricular soft tissue vascular flaps in canal wall down mastoidectomy for chronic otitis media with cholesteatoma.

**Material and Methods:** The prospective study (conducted between April 2017 to April 2018) randomly assigned patients with evidence of CSOM with cholesteatoma to two groups (25 in each group, case and control group). After canal wall down mastoidectomy, undergoing obliteration of mastoid cavity with postauricular soft tissue vascular flap in case group and left open cavity in control group.

**Results:** The result was found that healing rate was 100%, 92.30% and 57.14% for small, medium and large cavity respectively in oblitative group (case), as compared to 100%, 63.63% and 40% respectively in the non-oblitative group (control).

**Conclusion:** The present study concluded that mastoid cavity obliteration is better for elimination of cavity problems after canal wall down mastoidectomy.

**Ethical consideration:** The study protocol was reviewed and approved by institution ethical committee.

**Keyword:** Canal wall down mastoidectomy (CWD), Mastoid infection, Obliteration

## Introduction

Open mastoidectomy technique has a long-distinguished history and has been the mainstay of the management of cholesteatoma for the past one and half century <sup>[1]</sup>. Open cavity procedures can be broadly defined as those requiring the removal of the posterior wall of the external auditory canal. These procedures are identified by many names—canal wall down mastoidectomy, modified radical mastoidectomy, radical mastoidectomy and the Bondy mastoidectomy—depending on how the middle ear and the disease are managed. The purpose of the open cavity procedure is to exteriorize the mastoid cavity for future monitoring of recurrent cholesteatoma, provide drainage for unresectable temporal bone infection, and occasionally, provide exposure for difficult to access areas of temporal bone <sup>[3]</sup>.

Within 40 years of introduction of mastoidectomy technique, significant modifications were introduced to try to improve the long-term stability of the cavity. Since then, countless

Otolologists have exercised their ingenuity on surgical techniques and modifications aimed at improving the status of the cavity or of avoiding or eliminating a cavity altogether.

The concept of mastoid obliteration was first introduced in 1911 by Mosher to promote healing of a mastoidectomy defect. Over the course of this century, there have been numerous reports detailing a variety of techniques of obliterating the mastoid cavity. The vast majority of obliteration techniques consist of either local flaps (muscle, periosteum, or fascia) or free grafts (bone, cartilage, hydroxyapatite, and so on). Mosher's original description was that of a superiorly based postauricular soft tissue flap<sup>[3]</sup>.

Mastoid reconstruction and obliteration procedures can be classified into two main categories:

- a) Free grafts, which are further subdivided into biologic and non-biologic.
- b) Local flaps.

Free Grafts-Biologic Techniques include the use of cortical bone pate, allogeneous/autogenous bone chips, cartilage, fat and fascia to fill the mastoid cavity after CWD mastoidectomy. Free Grafts-Non biologic Techniques include the use of hydroxyapatite crystals, calcium phosphate ceramic granules and bioactive glass ceramics to fill or reconstruct the canal wall following CWD mastoidectomy.

Local flaps-several types of flaps were used including the Palva flap (Mentally-based musculoperiosteal flap), middle temporal artery flap, Hong Kong flap, temporoparietal fascial flap (TPFF), pedicled superficial temporalis fascial flap, postauricular-periosteal-pericranial flap, temporalis muscle flap, inferiorly based fascial periosteal flap and postauricular myocutaneous flap.

The most common indication for mastoid obliteration is following canal wall down mastoidectomy for chronic otitis media. A canal wall down mastoid cavity, if not obliterated, can result in persistent otorrhea that can be difficult to control even with topical antibiotic therapy and frequent cleaning of the cavity. Other problems associated with a mastoid cavity may include the need for frequent cleaning, difficulty with the use of a hearing aid, water intolerance due to a susceptibility to infection, and propensity to vertigo by a caloric stimulus such as warm/cold air or water. Obliteration of the mastoid cavity is indicated to reduce the size of the cavity. It is ideally conducted as a primary procedure at the time of canal wall down mastoidectomy<sup>[4]</sup>. Canal wall down mastoidectomy and mastoid cavity obliteration is a routine surgical procedure done in our ENT Department. SO we need to study the end result and benefits of this procedure in management of unsafe type of CSOM.

The aim of this study is to evaluate the surgical outcome of mastoid cavity obliteration with postauricular soft tissue in canal wall down mastoidectomy and compare these results to those obtained with canal wall down mastoidectomy without mastoid obliteration.

### **Material and method**

This study was conducted on 50 patients of CSOM having unsafe type of disease attending Department of ENT, with written informed consent, willing for regular follow up, in RNT Medical College and MB Hospital, Udaipur from April 2017 to April 2018.

### **Inclusion criteria**

- 1) All CSOM cases with cholesteatoma where we are sure of complete extirpation.
- 2) All cases of CSOM with extensive granulations.
- 3) Recurrent cases of cholesteatoma.

### **Exclusion criteria**

Known CSOM cases with intracranial complications

## Method of collection of data

### Clinical evaluation

All patients underwent detailed medical history and clinical examination. Each patient underwent otoscopic examination, PTA, bilateral mastoid x-ray and HRCT temporal bone (if needed).

The primary outcome measure was the creation of a dry, infection free, low maintenance mastoid cavity as assessed by a grading system developed by Merchant *et al.*,<sup>[1]</sup>. The semi-quantitative scale takes into consideration both patient symptomatology and clinical sign such as otorrhea and the presence of infection. The scale ranges from grade 0, representing a complete dry, healed ear, through to grade 3, in which there is persistent infection.

**Grade 0:** No episode of otorrhea, and no pus or granulation tissue on otoscopy.

**Grade 1:** One episode of otorrhea of <2 weeks duration in a 3-month period or no otorrhea but a subjective feeling of wetness in the ear.

**Grade 2:** More than one episode of otorrhea in a 3-month period, or an episode of otorrhea lasting >2 weeks or demonstration of localized granulation tissue/ pus that was promptly cured with antibiotic drops, curettage or vinegar drops.

**Grade 3:** Constant purulent otorrhea on a daily basis, or examination showing extensive granulation tissue, or needed for a revision procedure to control infection.

Grades 0, 1 and 2 are considered adequate control of infection, whereas grade 3 indicate failure of control of infection.

Secondary outcome measure includes postoperative complication and hearing improvement which were assessed by PTA.

### Surgical procedure

After induction of GA, the ear was prepared by pouring povidone iodine solution and spirit into the ear canal and scrubbing the auricle and post auricular area. Lignocaine with 1:100000 epinephrine was injected into the post auricular region and the ear canal for hemostasis.

Incisions were made in the ear canal and posterior meatal skin flap was elevated. A post auricular incision was made in the post auricular skin crease and a plane is developed between the subcutaneous tissue and temporalis muscle and periosteum of the mastoid. Several pieces of areolar tissue and temporalis fascia was harvested and set aside to dry.

Subcutaneous incision was then made for exposure of mastoid cortex and middle ear<sup>[10]</sup>. A horizontal incision was made superior to the temporal line through temporalis muscle and a curvilinear incision is carried down to mastoid tip along the posterior canal. The mastoid bone is exposed using periosteal elevator by raising periosteum posteriorly, the vascular strip is elevated and reflected out of ear canal anteriorly using a self-retaining retractor. Canal flap was elevated and rotated anteriorly and secured in the anterior sulcus.

A simple mastoidectomy was done using a large cutting burr. Cholesteatoma and granulations filling the central mastoid tracts were removed at this time. Posterior canal wall was safely taken down and the facial ridge can be lowered until a thin layer of bone removed over the vertical segment of facial nerve. Removal of anterior and posterior buttress was done. Ossicular chain was assessed, and if diseased they were removed. Total clearance of cholesteatoma and granulation from mastoid cavity, attic and middle ear was done along with saucerization of mastoid cavity. This step was followed by underlay myringoplasty, anterior tugging and ossiculoplasty. Free skin grafting over the fascia and bone was done.

Mastoid cavity was now obliterated by extending the post-aural incision superiorly so as to expose the temporalis muscle covered with the temporalis fascia. The middle temporal artery was identified by palpation. An approximately 5cm long myofascial flap was dissected out based anteriorly on the artery. The flap was rotated into the middle ear cavity so as to obliterate the mastoid cavity with the muscle inside and the fascia facing outside. An edge of the fascia was advanced over the middle ear space so as to form the tympanic membrane graft. A piece of gel foam was used to mark the position of the external auditory meatus,

around which the myofascial flap was positioned. Adequate meatoplasty was done. Finally, the EAC was packed with ointment pack. The post auricular incision closed in layers after completion of hemostasis. A bulky pressure dressing was applied.

### Postoperative treatment and follow-ups

Each patient was given an antibiotic, analgesic and antihistaminic medication for one week. Ear pack was removed two weeks after surgery. Patients were discharged on the 7<sup>th</sup> postoperative day and were appointed for follow-up, after one week and one month PTA was carried out at 3 and 6 months respectively.

### Observation & Results

Fifty cases of active squamous chronic otitis media were studied. The patient was randomly divided into two groups of 25 each. One group underwent mastoid obliteration with middle temporal artery flap and other group had obliteration done i.e. had an open mastoid cavity. In our study 40% patients presenting with active squamous chronic otitis media were in the age group 11-20 years (9 case +11 control), 24% were between 20-30 years (6 case+6 control), 10% were less than 10 years (3 case+ 2 control) and 25% were above 30 years of age (7 case + 6 control).

**Table 1:** Presenting complaints

Complaints	Case (n=25)	Control (n=25)	Total
Ear discharge	25	24	49
Decreased hearing	23	22	45
Tinnitus	3	2	5
Vertigo	2	1	3

In our study, 98% (25 case + 24 control) of patients presented with complaints of ear discharge. 90% (23 case +22 control) of patients presented with history of decreased hearing and only 10% (3 case+ 2 control) and 6% (2 case +1 control) had complaints of tinnitus and vertigo respectively.

**Table 2:** Otoscopic findings seen in the patients enrolled for the study

Findings	Case (n=25)	Control (n=25)	Total
Cholesteatoma	19 (76%)	23 (92%)	42 (84%)
Granulations	3 (12%)	2 (8%)	5 (10%)
Polyp	3 (12%)	0 (0%)	3 (6%)
Outer attic wall erosion	12 (48%)	8 (32%)	20 (40%)
Retraction pocket	10 (40%)	11 (44%)	21 (42%)
Debris	3 (12%)	2 (8%)	5 (10%)
Marginal perforation	5 (20%)	3 (12%)	8 (16%)

84% of patients had cholesteatoma, 10% had granulations and only 6% had polyp. In 40% patients had outer attic wall erosion and in 42% patients had retraction pocket and in 10% patients had debris. Marginal perforation was found in 16% patients.

**Table 3:** Postoperative observation (Pain)

Follow-up	Case	Controls	Total
Post OP Day 15	3 (12%)	15 (60%)	18 (36%)
Post op day 1 month	1 (4%)	3 (12%)	4 (36%)
Post op day 3 month	0	0	0
Post op day 6 month	0	0	0

On post-operative day 15, 15(60%) patients of control group had pain, while only 3 (12%)

patients of case group experienced pain. On post-operative day 30, only 1 (4%) patients of case group had pain, while 3 (12%) of control group experienced pain. There was no complain of pain after 3 months of follow-up.

**Table 4:** Postoperative observation (discharge)

Follow-up	Case	Controls	Total
Post op day 15	12 (48%)	17 (68%)	29 (58%)
Post op 1 month	7 (28%)	10 (40%)	17 (34%)
Post op 3 month	5 (20%)	10 (40%)	15 (30%)
Post op 6 month	1 (4%)	3 (12%)	4 (8%)

The post-operative day 15 of the 25 cases. 13 (52%) patients had a dry cavity, whereas 12 (48%) patients still had ear discharge. Of the 25 control cases, 8 (32%) had a dry cavity and 17 (68%) still had ear discharge.

One month after surgery, of the 25 cases, 18 (72%) patients had a dry cavity, whereas 7 (28%) patients still had ear discharge. Of the 25 controls, 15 (60%) had a dry cavity and 10 (40%) still had ear discharge.

Three months after surgery, of the 25 cases, 20 (80%) patients had a dry cavity, whereas 5 (20%) patients still had ear discharge. Of the 25 control, 15 (60%) had a dry cavity and 10 (40%) still had ear discharge.

Six months after surgery, of the 25 cases, 24 (96%) patients had a dry cavity, whereas 1 (4%) patient still had ear discharge. Of the 25 controls, 22 (88%) had a dry cavity and 3 (12%) still had ear discharge.

**Table 5:** Postoperative observation (Epithelization)

Follow-up	Cases	Controls	Total
Post op day 15	10 (40%)	1 (4%)	11 (22%)
Post op 1 month	17 (68%)	12 (48%)	29 (58%)
Post op 3 month	20 (80%)	15 (60%)	35 (70%)
Post op 6 month	22 (88%)	17 (68%)	39 (78%)

The post-operative day 15 of the 25 cases. 10 (40%) patients had epithelization, whereas of the 25 control, 1 (4%) patient had epithelization.

One month after surgery, of the 25 cases, 17 (68%) patients had epithelization, whereas of the 25 control, 12 (48%) patients had epithelization.

Three months after surgery, of the 25 cases, 20 (80%) patients had epithelization, whereas of the 25 control, 15 (60%) patient had epithelization.

Six months after surgery, of the 25 cases, 22 (88%) patients had epithelization, whereas of the 25 control, 17 (68%) patient had epithelization.

**Table 6:** Comparison of cavity size and healing of cavity

Cavity size	Technique	No. of cases	No. of healed cavities	%
Small	Obliteration	5	5	100
	No Obliteration	9	9	100
Medium	Obliteration	13	12	92.30
	No Obliteration	11	7	63.63
Large	Obliteration	7	4	57.14
	No obliteration	5	2	40

The relation of healing of cavity with size of the cavity was studied. It was found that healing rate was 100%, 92.30% and 57.14% for small, medium and large cavity respectively in obliteration group, as compared to 100%, 63.63% and 40% respectively in the non-obliteration group.

**Table 7:** Time of drying of cavity

Time period	Cases		Control	
	Number	% Age	Number	% Age
Post op day 15	2	8	0	0
Post op 1 month	9	36	1	4
Post op 3 month	12	48	7	28
Post op 6 month	2	8	17	68

Mean time of drying of cavity 3 months in case group, while it was 6 months in control group. The comparison between the time of drying of cavity of case group and control group was found to be statistically significant ( $p<0.05$ ). This shows that there was definite and statistically significant decrease in time of drying of cavity in case group as compared to control group.

**Table 8:** Hearing status

Gain of air conduction	Cases		Control	
	Number	% Age	Number	% Age
No gain	1	4	2	8
< 10dB	15	60	19	76
11-20 dB	5	20	4	16
21-30 dB	4	16	0	0

In our study, in 50 patients' postoperative audiometry was done and there was a gain of 21-30 dB in 16% of cases and a gain of 11-20 dB in 20% of cases, while in control group only 16% of control had gain of 11-20dB and no control had gain of >20dB. 1-10dB gain was seen in 60% of case group and 76% of control group. There was no gain in 4% of case group and 8% of control group. Therefore, we can say that mastoid obliteration seems to be better than control for improvement in hearing.

**Table 9:** Merchant *et al.* grading for Clinical Evaluation

Grading	Case (n=25)		Control (n=25)	
	No.	%	No.	%
0	21	84%	18	72%
1	2	8%	3	12%
2	1	4%	2	8%
3	1	4%	2	8%

Merchant *et al.*, developed a grading system in which included a dry, infection free, low maintenance mastoid cavity. In our study in grade 0, 84% were of case group and 72% were of control group, followed by 8% in case group and 12% in control group for grade 1, 4% in case group and 8% in control group for grading 2 and 4% in case group and 8% in control group for grade 3.

**Table 10:** Result of complications

Complications	Cases	Controls
Occasional otorrhea	4%	16%
Infection	4%	12%
Flap necrosis	4%	0
Medial stenosis	4%	0
Perichondritis	0	4%
Postop. Granulation	0	4%
Cholesteatoma recurrence	0	0

In our study postoperative complications were studied. Occasional otorrhea was present in 16% of control and 4% of case group, followed by infection in 12% of control and 4% of case group, flap necrosis in 4% of case group and none in control, medial stenosis in 4% of case group and none in control, perichondritis in 4% of control group and none in case and postop. Granulation in 4% of control group and none in case. There was no case of con.

## Discussion

In the present study, data revealed that the patient encountered were in age group of 9-50 years, the mean age of patient was 30 years, patients aged between 11-20 years more in study, 20(40%) while patient aged between < 10 years were encountered least, only 5 (10%).

In a study of Navjot Kaur, Dinesh Kumar Sharma and Jagdeepak Singh *et al.*, (2016) 57.5% patients were 20 years or less in age. The youngest patient was eight-year-old and patient was 60-year-old of age with male predominance among the patients included in the present study (65% males and 35% females)<sup>[5]</sup>.

Shao-Cheng Liu, Chi-Hung Wang, Bor-Rong Huang *et al.*, (2015), Forty-four patients met the study criteria, 21 men and 23 women with average age of years (range, 17 to 69 years)<sup>[6]</sup>.

In the present study there were 25 females and 25 males and female to male ratio was 1:1.

In study by Samand Ghisai *et al.*, (2015), there were 44% male and 56% female. In another study by George Kurien, Kate Greeff, Nahla Gomaa and Allan HO *et al.*, (2015), there were 31 male and 27 females<sup>[7]</sup>.

In the present study, 98% of patient presented with complaints of ear discharge. 90% of patients presented with history of decreased hearing and only 10% had complaints of tinnitus and 6% had vertigo respectively.

In a study of S, Chhapola, Matta I *et al.*, (2014), 95% of patient presented with complaints of ear discharge, 87.5% of patients present with history of decreased hearing and only 15 and 5% had complaints of tinnitus and vertigo respectively<sup>[8]</sup>.

In the present study during otoscopic examination 84% of patient had cholesteatoma, 10% had granulation, and 6% had polyp.

In study of S, Chhapola, Matta I *et al.*, (2014) eighty percent of patients had cholesteatoma, 12.5% had granulation and only 7.5% had polyp<sup>[8]</sup>.

In the present study additional finding on otoscopic examination were retraction pocket in 42%, outer attic wall erosion in 40%, marginal perforation in 8% and debris in 5% patients.

In a study of Navjot Kaur, Dinesh Kumar Sharma and Jagdeepak Singh (2016) the most common additional finding on otoscopic examination was visible cholesteatomata's flakes in 42.5%, retraction pocket in 42%, outer attic wall erosion in 40%, marginal perforation in 6%, and debris in 5% patients. Other findings seen were granulations in external auditory canal and aural polyp<sup>[5]</sup>.

In the present study, follow up was done after 15 days, 1 month, 3 month and 6 month of operation and evaluated for pain, discharge, epithelization, comparison of cavity size and healing of cavity, time of drying of cavity, hearing status, and complications.

In study by S, Chhapola, Matta I *et al.*, (2014), on post-operative day 15, 12 (60%) patients of control group had pain, while only 8 (40%) patients of case group experienced pain. On post-operative day 45, only 1 (5%) patients of case group had pain, while 2 (10%) of control group experienced pain<sup>[8]</sup>.

In the present study on postoperative day 15, 15 (60%) patients of control group had pain, while only 3(12%) patients of case group experienced pain. On postoperative day 30, only 1 (4%) patient of case group had pain, while 3 (12%) of control group experienced pain.

In study by S, Chhapola, Matta I *et al.*, (2014), of the 20 cases, 15 (75%) patients had a dry cavity at the end of 2 months whereas 5 (25%) patients still had ear discharge. Of the 20 control cases, 12(60%) had a dry cavity and 8 (40%) still had ear discharge. In addition to this 1 (5%) patient of control group had giddiness at the end of same period.

Three months after surgery, of the 20 cases, 16(80%) patients had dry cavity whereas 4(20%) patients still had ear discharge. Of the 20-control case, 12(60%) had a dry cavity and 6 (30%)

still had ear discharge. In addition to this 1 (5%) patient of control group had giddiness and 2 (10%) presented with wax 6 month after surgery, of the 20 cases, 18 (90%) patients had a dry cavity whereas 1 (5%) patient still had ear discharge and 1 (5%) presented with wax. Of the 20-control case, 14 (70%) had a dry cavity and 2 (10%) still had ear discharge. In addition to this 1 (5%) patient of control group had giddiness and 4 (20%) presented with wax.

Six months after surgery, of the 20 cases, 18 (90%) patients had a dry cavity whereas 1 (5%) patient still had ear discharge and 1 (5%) presented with wax. Of the 20 control cases, 14 (70%) had a dry cavity and 2 (10%) still had ear discharge. In addition to this 1 (5%) patient of control group had giddiness and 4 (20%) presented with wax.

In the present study on postoperative day 15, of the 25 cases, 13 (52%) patients had a dry cavity whereas 12 (48%) patients still had ear discharge. Of the 25-control patient, 8 (32%) had a dry cavity and 17 (68%) still had ear discharge.

1 month after surgery, out of the 25 cases, 18 (72%) patients had a dry cavity whereas 7 (28%) patients still had ear discharge. Of the 25-control patient, 15 (60%) had a dry cavity and 10 (40%) still had ear discharge.

3 months after surgery, out of the 25 cases, 20 (80%) patients had a dry cavity whereas 5 (20%) patients still had ear discharge. Of the control patient, 15 (60%) had a dry cavity and 10 (40%) still had ear discharge.

6 months after surgery, out of the 25 cases, 24 (96%) patients had a dry cavity whereas 1 (4%) patient still had ear discharge. Of the 25 control, 22 (88%) had a dry cavity and 3 (12%) still had ear discharge.

In a study of Navjot Kaur, Dinesh Kumar Sharma, and Jagdeepak Singh *et al.*, (2016) on post-operative day 90, epithelization was present 100% in both case and control group<sup>[5]</sup>.

In the present study on postoperative day 15, of the 25 cases, 10 (40%) patients had epithelization the 25-control patient, 1 (4%) patient had epithelization.

1 month after surgery, of the 25 cases, 17 (68%) patients had epithelization of the 25-control patient, 12 (48%) patients had epithelization.

6 months after surgery, of the 25 cases, 22 (88%) patients had epithelization. Out of the 25-control patient, 17 (68%) patients had epithelization.

In a study of S. Chhapola, Matta I *et al.*, (2014), the relation of healing of cavity with size of the cavity was studied. It was found that healing rate was 100%, 90.90% and 66.60% for small, medium and large cavity respectively in obliteration group, as compared to 100%, 63.63%, and 40% respectively in the non-obliteration group<sup>[8]</sup>.

The result of the present study is similar to the above-mentioned studies and found that healing rate was 100%, 92.30% and 57.14% for small, medium and large cavity respectively in obliteration group, as compared to 100%, 63.63% and 40% respectively in the non-obliteration group.

In a study by Mangal Singh, Sachin Jain, Ruchi Rajput, Ravindra K Khatua, Devashish Sharma *et al.*, (2010) mean time period of drying of cavity was 46 days (1.5 month), in case group, while it was 89 days (3 month) in control group. This shows that there was definite and statistically significant decrease in time of drying of cavity in case group as compared to control group<sup>[9]</sup>.

In present study mean time of drying of cavity 3 month in case group, while it was 6 months in control group.

In a study by Mangal Singh, Sachin Jain, Ruchi Rajput, Ravindra K Khatua, Devanish Sharma *et al.*, (2010), in 34 patients post-operative audiometry was done and there was a gain of 21-30db in 13.3% of cases and a gain of 11-20db in 20% of cases, while in control group only 15.7% of controls had gain of 11-20db and no control had gain of >20db, there was a deterioration of hearing of 1-10db in patients of control group.

In the present study, in 50 patient post-operative audiometry was done and there was a gain of 11-30db in 16% of cases and a gain of 11-20db in 20% of cases, while in control group only 16% of control had gaining 11-20db and no control had gain of >20db. 1-10db gain was seen in 60% of case group and 76% of control group, there was no gain in 4% of case group 8% of

control group.

Olsan *et al.*, (2002), used the pedicled superficial temporalis fascial flap in 15 patients for reconstruction of mastoid cavity following otologic procedures had no complications related to reconstruction except for one episode of perichondritis<sup>[11]</sup>.

In the present study 4% occasional otorrhea present in case group and 16% of control group. Infection presents in 4% case group and 12% control group. Flap necrosis present in 4% cases, perichondritis present in 4% of control group cholesteatoma recurrence was not seen.

Therefore, we can say that mastoid obliteration seems to be better than control for improvement in hearing.

### Summary & Conclusion

The following conclusions were drawn from this study.

- 1) The incidence of pain, discharge, giddiness and wax formation was markedly reduced in obliterated cavities as compared to open cavities.
- 2) Healing of the cavity as evidenced by epithelization, was better in those ears where cavity was obliterated as compared to those where cavity was kept open.
- 3) Patients with obliterated mastoid cavity required less cavity care, thus decreasing doctor dependence, frequent OPD visits and fewer courses of medical treatment and fewer burdens on hospital resources.
- 4) Hearing gain was more in mastoid oblitative group as compared to non-oblitative group.
- 5) Cavity dried fast in oblitative group as compared to non-oblitative group.
- 6) Complication rate was lower in oblitative group as compared to non-oblitative group.
- 7) Hearing aids, if required, are better tolerated in an obliterated cavity than an open cavity.

The present study concluded that mastoid cavity obliteration is better for elimination of cavity problems after canal wall down mastoidectomy.

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