Comparative Study of Management of Attico-antral CSOM by Conventional Mastoidectomy with Inside Out Technique

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Abstract This prospective study was undertaken to compare the different aspects of inside out and conventional mastoidectomy techniques in attico-antral type of chronic suppurative otitis media. 100 cases of unsafe ear selected in this study were divided in 2 groups—(1) Group A—50 patients operated by conventional technique of canal wall down mastoidectomy. (2) Group B—50 patients operated by inside out technique of canal wall down mastoidectomy. The patients in our series were regularly followed to assess the condition of the postoperative cavity for three months. Post operative results were better by inside out as compared to conventional technique of mastoidectomy. Hearing and air-bone gap improvement was more in patients operated by inside out mastoidectomy. Less number of patients suffered with post operative residual disease like cholesteatoma, granulation, discharge and residual perforation as compared to conventional mastoidectomy.

Keywords Mastoidectomy · Inside-out · Attico-antral

Introduction

Canal wall down surgeries are the commonly performed surgeries for cholesteatoma [1]. Canal wall down techniques include radical and the modified radical mastoidectomies. The canal wall down mastoidectomy can be performed beginning with either laterally or medially. The ‘classic mastoidectomy’ begins by removing the lateral mastoid cortex, entering the antrum and later removing the posterior

bony canal wall. Because it begins laterally at the cortex, such operations are often termed as ‘outside in or lateral-to-medial mastoidectomies’. Mastoidectomies can be performed from medial to lateral. Here the dissection is begun by removing the bone from where the cholesteatoma usually starts i.e. at the attic and the cavity is progressively enlarged from medial to lateral and a complete mastoidectomy is accomplished. This approach is also known as the ‘inside-out [2, 3] or medial-to-lateral mastoidectomy’.

Materials and Methods

This prospective study was undertaken to compare the different aspects of inside out and conventional mastoidectomy techniques in attico-antral type of chronic suppurative otitis media. 100 cases of unsafe ear selected in this study were divided in 2 groups-

1. Group A—50 patients operated by conventional technique of canal wall down mastoidectomy.
2. Group B—50 patients operated by inside out technique of canal wall down mastoidectomy.

Observations and Results

All cases of attico-antral type of CSOM were included in the study and followed up to 3 months after surgical treatment.

1. In this study, majority of the patients 34 (34%) belonged to the age ranging from 31 to 40 years. Least number of patients 2 (2%) were in the age from 51 to 60 years. Males 54 (54%) were slightly predominated

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over females 46 (46%). 45 (45%) were having Right ear discharge and 55 (55%) were having Left ear discharge.

- Otorrhea and hearing loss were the commonest complaint among all 100 cases, followed by pain in ear in 15% cases, Tinnitus in 4% cases, and Vertigo in 2% cases. Purulent discharge was present in 53% of patients. 47% patients were having muco-purulent discharge.

Symptoms distribution (n=100)

- Attic perforation was present in 40 (40%) patients. Central perforation with retraction pocket was seen in 34 (34%) patients. 26% patients had marginal perforation.
- 38% of patient were having moderate hearing loss. Moderately severe hearing loss present in 35% of patient. 27% patients having mild Hearing loss, probably due to cholesteatoma bridging effect. 54% of the patient having air-bone gap of more than 30 dB. 46% of patient having air bone gap between 11 and 30 dB.
- In Group A, all 50 patients were operated by conventional technique while in group B all 50 patients were operated by inside out technique in which 62% were operated by attico-anthroscopy and rest (38%) are operated by MRM. 65% were operated by type III tympanoplasty. 22% patients were operated by type II tympanoplasty.
- Intraoperatively, necrosed incus was noticed in 76% of cases. Malleus was necrosed in 77 (77%) of all cases. Stapes superstructure was found necrosed in 12% cases. cholesteatoma was more common in group B (87%) than group A (82%).
- Post operative improvement in pure tone average was more (39 Patients, 78%) in group B than in group A (36 Patients, 72%). There was no improvement in 7 (14%) patients in group A and 6 (12%) patients in group B. Hearing deteriorated in 7 (14%) patients in group A and in 5 (10%) patients in group B. Post operative improvement in A–B gap was more (38 Patients: 76%) in group B than in group A (35 Patients: 70%). There was no improvement in A–B gap in 8 (16%) patients in group A and 7 (14%) patients in group B. A–B gap deteriorated in 7 (14%) patients in group A and in 5 (10%) patients in group B.

Group A (Conventional) (n=50)

Group B (Inside out) (n=50)

- Post-operative discharge was more in group A (7 Patients, 14%) than in group B (5 Patients, 10%). Residual cholesteatoma was more in group A (2 Patients, 4%) than in group B (1 Patient, 2%). TM residual perforations were more in group A (6 Patients, 12%) than in group B (4 Patients, 8%). Granulations were more in group A (7 Patients, 14%) than in group B (5 Patients, 10%). No complications were noted in 100 patients taken for our study in both group. Dry cavities were seen more in group B (45 Patients, 90%) than in group A (43 Patients, 86%).

Group A (Conventional) (n=50)

Group B (Inside out) (n=50)

Discussion

In our study, Intra-operative examination of the middle ears revealed granulations in 31 (62%) of the cases in group A of conventional mastoidectomy and granulations were found in 19 (38%) of group B. Out of total 100 patients, 50 had granulations.

Cholesteatoma was found in the group A in 41 (82%) of cases, while it was found in group B patients in 46 (92%) cases. Total 87% patients had cholesteatoma in 100 patients.

Ossicular Necrosis

In conventional mastoidectomy group, Intra-operatively, 39 (78%) of the cases had a necrosed incus, which was higher compared to second group of inside out technique, where it was 37 (74%) and in total 100 patients, it was noticed in 76% of cases. Malleus was necrosed in 43 (86%) of group A cases and in group B it was in 34 (68%) cases. In total 100 patients, Malleus was necrosed in 77 (77%) cases. Stapes superstructure was necrosed in 11 (22%) of group A cases and 1 (2%) case on group B (Inside-Out technique). In total 12% cases, stapes supra structure was found necrosed.

We compared our study with study of Saurabh Varshney and others [4] on ossicular chain status in CSOM. In this study, malleus was found intact in 33 (55.00%), necrosed in 21 (35.00%) and absent in 6 (10.00%) cases of unsafe CSOM. In unsafe CSOM, incus was found intact in 9 (15.00%), necrosed in 27 (45.00%) and absent in 24 (40.00%) cases. In unsafe CSOM, 29 (48.33%) cases had an intact stapes and 31 (51.67%) showed erosion of the superstructure of stapes.

hearing loss. Of these 50 cases, 24 (48%) patients had a moderate hearing loss.

In other group B of Inside out technique, 23 (46%) cases had mild hearing loss, whereas 14 patients i.e. 28% had moderate hearing loss. Postoperatively, the 11–30 dB air bone gap was found to be 26 (52%) in group A of conventional mastoidectomy group and it was in 28 (56%) in group B. Postoperatively, more than 30 dB air bone gap was found to be 24 (48%) in group A of conventional mastoidectomy group and it was in 19 (38%) in group B.

Post-operative Pure Tone Average

Post operative improvement in pure tone average was more (39 Patients: 78%) in group B of Inside out technique of 50 Patients, while it was 36 (72%) in group B of conventional mastoidectomy group. There was no improvement in hearing in 7 (14%) patients group A and 6 (12%) patients in group B. Hearing deteriorated in 7 (14%) of conventional mastoidectomy group and in 5 (10%) of inside out mastoidectomy group.

Post Operative A–B Gap

Post operative improvement in A–B gap was more (38 Patients: 76%) in group B of Inside out technique of 50 Patients, while it was 35 (70%) in group B of conventional mastoidectomy group. There was no improvement in A–B gap in 8 (16%) patients group A and 7 (14%) patients in group B. A–B gap deteriorated in 7 (14%) of conventional mastoidectomy group and in 5 (10%) of inside out mastoidectomy group. This has occurred probably due to cholesteatoma hearing. Cholesteatoma and granulations may bridge between ossicles and TM remnant causing only

S. no.		Status of Ossicular chain					
		Malleus		Incus		Stapes	
		Intact (%)	Necrosed/absent (%)	Intact (%)	Necrosed/absent (%)	Intact (%)	Necrosed (Supra-structure) (%)
1.	Saurabh Varshney and others	55	45	15	85	48.33	51.67
2.	Our study	23	77	24	76	88	12

Postoperative Audiometry

It was the primary aim of the study to evaluate the hearing outcome after surgery; hence a postoperative PTA was obtained in all cases after 3 months. For the conventional mastoidectomy group (group A) results were analyzed on all 50 patients, 12 of the cases i.e. 24% of them had mild

mild hearing loss. In these cases hearing may deteriorate after surgery.

In our study of inside out technique post operative improvement in A–B gap was more (38 Patients: 76%) in group B of Inside out technique of 50 Patients. In the study done by Minovi and others [5], post operative hearing improvement with inside out technique was Air bone gap

of less than 20 dB achieved in 61.66% of cases, whereas Roth TN and others ⁵⁰(2009) mentioned improvement of A–B gap of less than 30 dB in 78% patients with inside out technique.

The average postoperative air bone gap in the series by Venkatarajamma K & Suryanarayanj Oshyam [6] on inside out technique was 18.03 dB and the average hearing gain was found to be 10.66 dB. 84% of patients had a problem free cavity while excessive wax and debris was seen in 9%. Discharge due to persistence of disease was seen in 7%.

Post Operative Follow-up

The patients in our series were regularly followed to assess the condition of the postoperative cavity for three months. Superficial infection of the cavity and a transient discharge was seen in about 7 (14%) of patients in group A and it was in 5 (10%) patients in group B. Recidivism in cholesteatoma was seen in 4% of the cases in group A i.e. A of our patients had residual disease, while residual cholesteatoma was seen in 1 (2%) of cases in group B of inside -out technique.

Post-operatively, Tympanic membrane perforations were seen in 6 (12%) of our cases of group A of conventional mastoidectomy and 4 (8%) of inside out technique group.

Granulations were noticed in 7 (14%) of our cases of group A of conventional mastoidectomy and 5 (10%) of inside out technique group. No complications were noted in 100 patients taken for our study in both group.

Cavity Condition on Follow-Up

All 100 cases were followed up till the end of the study. The Follow up period was 3 months. During this period, we inspected the cavities for any excessive accumulation of wax, fungal debris, and persistence of discharge. 43 (86%) patients in group A of conventional mastoidectomy had dry self cleansing cavities and rarely needed regular cleaning on their follow up visits. 7 (14%) cases had excessive accumulation of debris and wax. 45 (90%) patients in group B of inside out mastoidectomy had dry self cleansing cavities and rarely needed regular cleaning on their follow up visits. 5 (10%) cases of this group had excessive accumulation of debris and wax and had not healed properly.

Comparison with Other Studies

We compared our study with article published by Minovi and others [5] in Eur Arch Otorhinolaryngol, as this was the latest study (March 2014). There were 242 cases of inside out mastoidectomy done with follow up period of

20.3 months in above mentioned study. Our study was done for two year duration with follow -up period of 3 months. There were 100 patients divided into two groups of conventional mastoidectomy and inside out technique. In the study done by Minovi and others, there was no control group study of conventional mastoidectomy, whereas in our study we have compared inside out technique (Group B) with conventional mastoidectomy (Group A).

In our study, we have not studied recurrence of the cholesteatoma as follow up period was only 3 months, while Minova and others mentioned Recurrence in 12.7% of cases after a period of 20.3 months.

Venkatarajamma K & Suryanarayanj Oshyam [6] reported in their study on inside out technique that 84% of patients had a problem free cavity while excessive wax and debris was seen in 9%. Discharge due to persistence of disease was seen in 7%.

Conclusion

Post operative results were better by inside out as compared to conventional technique of mastoidectomy. Hearing and air-bone gap improvement was more in patients operated by inside out mastoidectomy. Less number of patients suffered with post operative residual disease like cholesteatoma, granulation, discharge and residual perforation as compared to conventional mastoidectomy. Post operative mastoid cavity formed in inside-out mastoidectomy was smaller in size as compared to conventional mastoidectomy because in inside-out mastoidectomy we followed the disease in direction of its spread, so lesser post operative mastoid cavity problem like discharge, deafness, dizziness, debris and long term doctor dependence, in patients operated by inside out technique of mastoidectomy.

We recommend this technique of mastoidectomy in patients having limited disease or anatomical variations like inferior lying dura and forward lying sinus. Every surgeon must learn this technique of mastoidectomy. This technique can be a better option for the treatment of attic-antral CSOM in the armamentarium of the ENT surgeons.

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