

## Original Research Article

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# Comparative evaluation of surgical and audiological outcomes in patients of chronic suppurative otitis media with dry ear treated by myringoplasty with or without simple mastoidectomy

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## ABSTRACT

**Background:** The study was conducted to compare and evaluate surgical and audiological outcomes in patients of chronic suppurative otitis media with dry ear treated by myringoplasty with or without simple mastoidectomy. Prospective, open label, randomized, comparative study, conducted in the Department of ENT, Ram Lal Eye and ENT hospital, Government Medical College Amritsar, Punjab, India.

**Methods:** This study comprised of 40 patients aged between 15 to 50 years having CSOM (safe type) with dry ears for the last 3 months. Patients were randomly divided into Group A treated with myringoplasty alone and Group B with standard simple mastoidectomy along with myringoplasty using temporalis fascia graft by underlay technique. Patients also subjected to routine hematological, biochemical, radiological and audiological investigation. The audiological comparison done before and after surgery.

**Results:** It was observed that graft uptake rate was better in group B. The average gain in air conduction threshold was more in patients who had undergone myringoplasty along with simple mastoidectomy. However this was not statistically significant. There was no significant improvement observed in the AB Gap in our patients who underwent myringoplasty or simple mastoidectomy along with myringoplasty.

**Conclusions:** Hypocellularity of the mastoid process has a strong correlation with the tubotympanic type of CSOM. Addition of mastoidectomy to simple myringoplasty has a very little beneficial effect on the postoperative hearing gain and graft uptake as it showed no much statistical significance.

**Keywords:** Surgical and audiological outcomes, CSOM treated by myringoplasty with or without simple mastoidectomy

## INTRODUCTION

Among the various causes of ear diseases, chronic suppurative otitis media (CSOM) is the major disorder in our country. CSOM is chronic inflammation of middle ear cleft which is composed of eustachian tube (ET), hypotympanum, mesotympanum, epitympanum, aditus, antrum, and mastoid air cells which presents with recurrent ear discharge or otorrhoea through a tympanic perforation.<sup>1</sup> In India, prevalence rate is 7.8% which is

very high. In Britain, 0.9% of children and 0.5% of adults have CSOM involving both the sexes equally.<sup>2</sup> Worldwide, there are 65-330 million sufferers, among them 60% have significant hearing loss.

According to Jackler et al many factors contribute to success or failure of surgery which are divided into mastoid and non-mastoid factors.<sup>3</sup> Holmquist and Bergstrom in 1978 said that well aerated mastoid is a prerequisite for well ventilated middle ear and long

lasting success.<sup>4</sup> Due to the currently existing controversies in role of mastoid and ET dysfunction in TM reconstruction, the study was conducted to compare and evaluate surgical and audiological outcomes in patients of chronic suppurative otitis media with dry ear treated by myringoplasty with or without simple mastoidectomy.

## METHODS

The study conducted in 40 patients presented to Department of ENT at the Ram Lal Eye and ENT Hospital attached to Government medical college, Amritsar during July 2014 to Dec 2016. An informed consent of patients was taken and approval from institutional ethical committee obtained.

All the patients were subjected to full history taking to document the onset, course, and duration of the disease, associated symptoms and previous treatment obtained including history of any ear surgery or trauma. Complete general physical and ear, nose and throat examination performed in each patient. These patients were also subjected to routine hematological, biochemical, radiological and audiological investigation. The audiological examination comprised of tuning fork tests, pure tone audiometry to determine air conduction and bone conduction threshold from 250-4000/8000 Hz. These patients underwent paper patch test and only those patients who showed improvement of 20 dB in pure tone average included in the study.

These patients were randomly divided into two groups and operated under general or local anesthesia after pre-anaesthetic checkup and anesthesia clearance was obtained. In patients of group A only myringoplasty was performed via post-auricular route using temporalis fascia graft by standard underlay technique. The patients of group B underwent standard simple mastoidectomy with myringoplasty using temporalis fascia graft by underlay technique. The patients were followed up on 30<sup>th</sup> and 90<sup>th</sup> day post-operatively.

On 90<sup>th</sup> day the external auditory canal was cleaned to remove any residual gelatin sponge packs if any. Otoscopic examination was performed to see status of external auditory canal for any narrowing or stenosis,

healing of tympanic membrane perforation, appearance of healed ear drum, its color, transparency, landmarks, thickness, mobility and any retraction. In patients who had a residual perforation on 90<sup>th</sup> day the size of residual perforation was recorded along with presence or absence of any ear discharge. All patients were subjected to pure-tone audiometry to determine any change.

The data so obtained was carefully recorded and collated. Appropriate statistical tests were applied to analyze the data. The level of significance was determined and p value of <0.05 was taken as statistically significant and p value >0.05 interpreted as the difference is not significant.

### Inclusion criteria

- Patients of safe type of CSOM with ear dry for the last three months.
- Patients aged between 15 to 50 years.
- Patients who demonstrate at least 20 dB improvements in pure tone threshold with paper patch test.

### Exclusion criteria

- Patients with evidence of sensorineural hearing loss in affected ear.
- Patients with evidence of atticoantral disease in affected ear.
- Patients with evidence of active infective processes in nose, sinuses, nasopharynx and oropharynx.
- Patients with deviated nasal septum, enlarged inferior turbinate, polyps in nasal cavities.
- Patients with history of prior ear surgery.
- Patients with psychiatric disturbances.
- Patients with bleeding diathesis.
- Patients with immunocompromised status.

## RESULTS

The average gain in PTA was  $19.08 \pm 6.201$  in patients who had undergone myringoplasty while the gain seen in patients who had undergone myringoplasty along with simple mastoidectomy was  $20.50 \pm 7.376$ . This was not statistically significant as having p value was 0.515.

**Table 1: Postoperative audiological assessment.**

PTA (Mean±SD)	Group A	Group B	P value
<b>Preoperative</b>	$37.00 \pm 8.388$	$40.75 \pm 8.028$	0.157
<b>Postoperative</b>	$17.92 \pm 4.863$	$20.25 \pm 6.737$	0.217
<b>PTA gain</b>	$19.08 \pm 6.201$	$20.50 \pm 7.376$	0.515

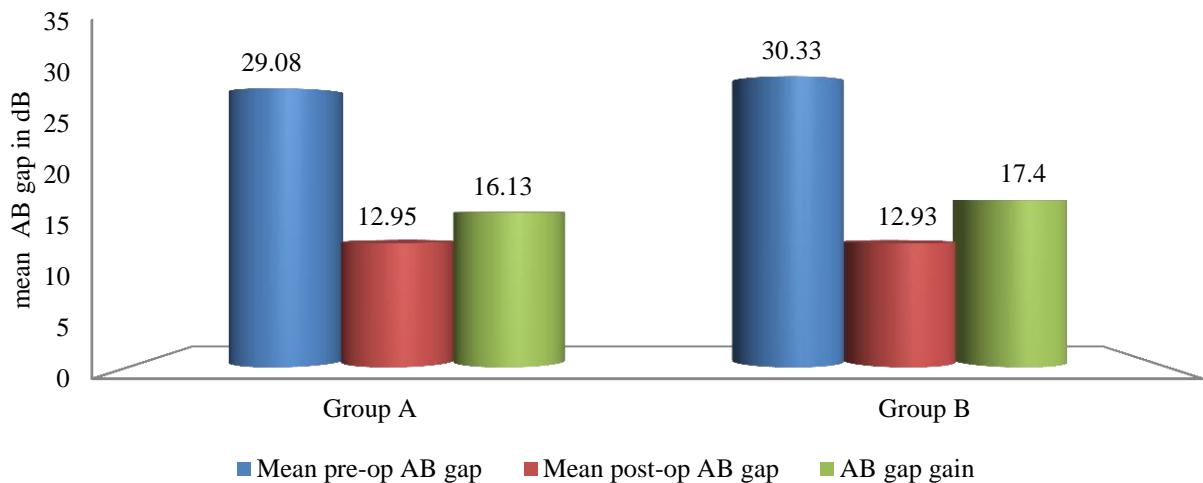
### Postoperative audiological assessment (AB gap)

In the present study pre-operative mean AB gap in patients of myringoplasty and in patients of

myringoplasty along with simple mastoidectomy was  $29.08 \pm 5.143$  dB and  $30.33 \pm 8.405$  dB respectively. Post-operatively mean AB gap was  $12.95 \pm 3.531$  dB in myringoplasty patients and  $12.93 \pm 3.738$  dB in patients of

myringoplasty along with simple mastoidectomy. Overall AB gap gain was  $16.13 \pm 5.221$  dB for group A and  $17.40 \pm 7.497$  for group B patients. The AB gap gain was not statistically significant in both groups.

The study showed that the status of graft uptake at 3 months of follow up was 90% in group A patients and 95% in patients of group B. It was statistically non-significant in both the groups.



**Figure 1: Postoperative audiological assessment.**

**Table 2: Status of tympanic membrane at 90 days -graft uptake.**

	Group A			Group B		
	Graft uptake	Residual perforation	Group Total	Graft uptake	Residual perforation	Group Total
<b>Number of patients</b>	18	2	20	19	1	20
<b>Percentage</b>	90%	10%	100%	95%	5%	100%

## DISCUSSION

In the present study, the success was defined as intact graft at least 3 months post-operatively. The success rate was 90% with myringoplasty and 95% with myringoplasty with simple mastoidectomy. These findings were consistent with those of the study done by Chavanet al.<sup>5</sup> It was observed that the success rate of graft uptake was also seen to be 100% with tympanomastoidectomy in the studies conducted by Nayak et al and Ashok et al.<sup>6,7</sup> However in the study conducted by Yasuo et al the graft uptake was seen to be slightly better with tympanoplasty (94.4%) than with tympanomastoidectomy(90.7%).<sup>8</sup>

In a study by Krishnan et al post-operative hearing gain was 75% in both groups.<sup>9</sup> Similarly, Balyan et al studied 48 patients with CSOM, treated by means of tympanoplasty with and without mastoidectomy and patients with current dry perforation with a history of CSOM treated with tympanoplasty alone. They found no significant difference in graft failure rates or hearing results compared with the literature or any difference in outcome measures whether drainage was present or not.

They also concurred that the addition of mastoidectomy had increased effort and risk to the surgery.<sup>10</sup>

In a study done by Toros et al tympanic membrane perforation closure was successful in 76.1% of the 46 patients undergoing myringoplasty and in 78.3% (n=36) of the 46 patients undergoing Myringoplasty with mastoidectomy. The difference between the closure rates of the two groups was not statistically significant ( $p>0.05$ ). The difference between the two groups for hearing gain was also not statistically significant ( $p>0.05$ ).<sup>11</sup>

Mishiro et al also supported the use of tympanoplasty without mastoidectomy in chronic non-cholesteatomatous otitis media with an equivalent rate of grafting success and hearing results regardless of the state of the ear at repair (draining vs. nondraining) or the addition of a mastoidectomy.<sup>12</sup>

A study by McGrew et al (2004) examined the effect of mastoidectomy with canal wall up on 484 dry, post infectious, non-operated, non-cholesteatomatous TM perforations v/s tympanoplasty alone. Their results showed identical perforation closure success rates of 91%

in each group. Comparision of hearing results were also statistically insignificant. With a mean follow-up time of 32 months in each group, there were more subsequent procedures related to the original indication for surgery in the group that underwent tympanoplasty alone, but this was not statistically significant.<sup>12</sup>

This was supported by Ryner Jose C stating that although mastoidectomy may be done on simple TM perforations there was no clear advantage for its routine practice in CSOM in absence of active infection or disease.<sup>13</sup>

In contrast to our study, a study conducted by Holmquist et al suggested that mastoidectomy improves the chance of successful tympanoplasty for patients with non-cholesteatomatous chronic otitis media. They maintained that creation of an aerated mastoid enhances success in patients with poor tubal function or a small mastoid air cell system.<sup>4</sup>

In a study conducted by Jackler et al of a sample size of 48 patients which were followed up for a period of 8 years had a success rate of 84.6% in tympanomastoidectomy revealing it as a safe and useful adjunct to tympanoplasty in selected cases.<sup>14</sup>

In a study conducted by Lau et al on a sample size of 229 patients which were followed up for a period of 11 years had a success rate of mastoid tympanoplasty recommending single stage, canal wall up mastoid tympanoplasty in non cholesteatomatous granulating otitis.<sup>15</sup>

In a study conducted by Nayak et al of a sample size of 40 patients which were followed up for a period of 20. 4 months had a success rate of 100% in mastoid tympanoplasty and 60% in tympanoplasty revealing that mastoidectomy is required in all cases.<sup>6</sup>

## CONCLUSION

Evaluating our observations in the light of available literature we concluded that hypocellularity of the mastoid process has a strong correlation with the tubotympanic type of CSOM. Addressing the mastoid region by mastoidectomy has very little beneficial effect on the postoperative hearing gain and graft uptake as it was statistically insignificant.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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