

A study of hearing improvement after tympanoplasty in cases of CSOM

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Abstract

Background: Chronic Suppurative otitis media (CSOM) one of the common diseases affecting the ear and is one of the leading causes of hearing impairment. Even though the hearing impairment can be effectively prevented by timely surgical intervention, in the form of tympanoplasty, the proportion of CSOM population undergoing this treatment is less in India. Scarcity of the studies documenting the efficacy of the procedure can be considered as an important reason for this phenomenon. Hence the present study has been conducted to assess the improvement in hearing following tympanoplasty among CSOM patients presenting to a tertiary care teaching hospital. **Materilas And Methods:** The current study was a prospective observational study, conducted in the department of ENT, Dhanalakshmi Srinivasan Medical College and Hospital May –2014 to April– 2016. A total of 50 CSOM cases treated with tympanoplasty during the study period and completed the follow up assessment constituted the study population. PTA was done as per ASHA, before and after surgery to assess hearing improvement. **Results:** Majority of the study population were between 26 to 35 years. Males constituted 54% of the study population. Major proportion (51.06%) had mucopurulent discharge. Out of 50 subjects, 37(74%) had central perforation, 8 (16%) participants had attic and 5 (10%) participants had marginal perforation. The overall proportion of subjects showing improvement in hearing postoperatively was 54% in the study. **Conclusion:** Timely treatment of preformation with tympanoplasty can have a significant positive impact on the hearing status of the affected individual, which in turn may have a positive impact on recurrent infection rates and quality of life of the individual.

Key Word: Csom, Hearing Improvement, Tympanoplasty,

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INTRODUCTION

Chronic suppurative otitis media -CSOM is an inflammation of the mucoperiosteal lining of the middle ear cleft. CSOM is defined as a persistent disease, insidious in onset, often capable of causing severe destruction of middle ear structure and irreversible sequel, which is clinically manifested with deafness and discharge more than 3 months¹ Perforation of tympanic

membrane and resulting impact on hearing is the common consequence of CSOM. Chronic middle ear disease is a major problem in India especially in the rural areas. It is estimated that 6% of Indian population suffers from chronic ear disease.² This is significantly higher than the incidence reported in western countries which is about 1.8%.³ There is a general lack of awareness of the disease and complications of the disease majority of our patients usually present at a very advanced stage. Tympanoplasty is a surgical procedure performed to repair and reconstruct the tympanic membrane. The procedure was introduced by Berthold and was further developed by Wullstein and Zollner.⁴ Closure of these perforations provide a barrier between the external pathogens and middle ear mucosa. It restores the vibrating area of the membrane and thus improves hearing. Hearing loss and ear discharge are the commonest symptoms patients present with and where medical management fails, surgical intervention in the form of Tympanoplasty is necessary to reduce the enormous degree of morbidity,

economics and social disability. There is a lack of awareness of the functional benefits of tympanoplasty/ossiculoplasty and are content to live with discharge and residual hearing loss. The possibility of primary reconstruction along with disease clearance in primary sittings before complications is also not often well realized.

AIM AND OBJECTIVES

1. Selection of CSOM patients with conductive deafness.
2. Assesstympanoplasty methods used for the treatment of hearing loss in cases of CSOM.
3. Analyse hearing improvement after tympanoplasty surgery.

MATERIALS AND METHODS

The current study was a prospective observational study, conducted in the department of ENT, Dhanalakshmi Srinivasan Medical College and Hospital between May – 2014 to April– 2016.

A total of 50 CSOM cases treated with tympanoplasty during the study period and completed the follow up assessment constituted the study population.

Inclusion criteria

1. All chronic discharging ear- active and inactive stage, unilateral and bilateral in either sexes and of the ages from 15 to 60 years with documented hearing impairment.

Exclusion criteria

RESULTS

A total of 50 subjects were included in the final analysis.

1. All ASOM
2. Otosclerosis
3. Tympanosclerosis
4. Adhesive otitis media
5. Congenital hearing disorder
6. CSOM with mixed or Sensor Neural Hearing Loss (SNHL)
7. Hearing loss due to Serous Otitis Media

All the patients in the study were clinically evaluated by taking detailed history and clinical examination including TFT, as pre the proforma. Broad spectrum antibiotics were given to dry up the ear discharge. Dry aural toilet was done to remove debris from the ear canal. Otomicroscopy was performed. Septic foci in the nose or in the throat were treated at the out patients in present. PTA was done as per ASHA. For all patients X-ray mastoid taken (scullers view) Cases then were diagnosed and surgical plan of management was formulated. The patients routine HB, BT, CT, urine analysis were done. Then the patients were subjected to middle ear cleft surgery under GA of LA. The patients subjective hearing enquired and recorded as improved, same (No change) or worse. Data analysis was done conducted using IBM SPSS statistical software version 22. Quantitative variables were summarized as mean and standard deviation, categorical variables were summarized as frequency and proportions. No inferential statistical analysis was performed.

Table 1: Descriptive analysis of demographic parameter in study population (N=50)

Demographic Parameter	Frequency	Percentage
Age group		
15 to 25	13	26%
26 to 35	18	36%
36 to 45	14	28%
46 and above	5	10%
Gender		
Male	27	54%
Female	23	46%

Among the study population, 13(26%) participants were aged between 15 to 25 years, 18 (36%) were aged 26 to 35 years, 14 (28%) were aged 36 to 45 years, 5 (10%) were 46 years and above. Among the study population male participants were 27 (54%) remaining 23 (46%) were female participants. (Table 1)

Table 2: Descriptive analysis of Symptomatology and signs in study population (N=50)

Parameters	Frequency	Percentage
Discharge		
Mucopurulent	24	51.06%
Purulent	11	23.40%
Bilateral Mucopurulent	10	21.27%
Bilateral purulent	2	4.26%
Perforation		
Central	37	74%
Attic	8	16%
Marginal	5	10%

The majority of the proportion 51.06% had mucopurulent discharge. The number of people, 11 (23.40%) had purulent, 10 (21.27%) had B/L Mucopurulent and 2 (4.26%) had B/L Purulent discharge. Among the study population, 37 (74%) participants had central perforation, 8 (16%) participants had attic and 5 (10%) participants had marginal perforation. (Table 2)

Table.3: Comparison of pre and post-operative ABG values

Pre OP hearing (dB)	Post-operative hearing(dB)			
	11- 20	21 – 30	31 – 40	41 – 50
21 – 30	10 (66%)	5 (34%)	0	0
31 – 40	4 (20%)	6 (30%)	9 (45%)	1 (5%)
41 – 50	0(0%)	2 (13%)	5(33%)	8 (54%)

The overall proportion of subjects showing improvement in hearing postoperatively was 54% in the study. Among the preoperative ABG dB group with 21-30, 10 (66%) improved to 11-20 dB group and 5 (34%) were remaining in 21-30 dB groups post operatively. Among the preoperative ABG 31 to 40 dB group, 4 (20%) improved to 11-20 dB, 6 (30%) improved 21-30 dB, 9 (45%) were remaining in 31-40 dB group and 1 (5%) worsened to 41-50 dB group. Among the preoperative ABG 41-50 dB group, 2 (13%) improved to 21-30 dB, 5(33%) improved to 31-40 dB and 8 (54%) were remaining in 41-50 dB category postoperatively. The overall proportion of subjects showing improvement in hearing postoperatively was 54% in the study. (Table 3)

DISCUSSION

Preoperatively, air-bone gap of 30 db or more was observed in 39 (78%) patients whereas post operatively gap of 30 db or more was observed in only one patient. Using hearing gain exceeding 15 dB as the criterion, 39 (78%) patients had their hearing gain exceeding 15 dB. Using postoperative A-B gap within 20 dB as the criterion, 42 (84%) patients had their A-B gap within 20 dB.¹ MuqtadirFaiz *et al* reported that the mean air-bone gap closure was 12.06 dB; with type I tympanoplasty with cortical mastoidectomy giving a maximum mean improvement of 16db. Minimum mean improvement of 1db was seen in type IV with modified radical mastoidectomy.⁵ Kolo ES *et al* conducted a retrospective review of the clinical records of 26 adult patients with a mean age of 35.85 years (SD 14.775). There were 16 males (61.54 %) and 10 females (38.46 %). The commonest presenting symptoms were ear discharge (80.8 %) and hearing loss (76.9 %); and the mean duration of symptom was 8.52 years (SD 8.599). The overall mean pre-operative pure tone average was 49.58

dB (SD 18.608), while the overall mean post-operative pure tone average was 37.38 dB (SD 17.837). The difference between the overall mean pre and post operative pure tone average (hearing gain) was 12.192 dB (SD 12.924) and this was found to be statistically significant ($p < 0.05$). Multiple linear regression models showed that only increasing age was significantly associated with increasing mean post-operative pure tone average. This study found primary tympanoplasty effective in improving hearing results in adults with chronic suppurative otitis media even in those with advanced ossicular lesions.⁶ Gupta S *et al* observed that hearing loss and otorrhea were present in majority of the cases (100% and 72%, respectively). A total of 18 of the cases had cholesteatomatous chronic suppurative otitis media, while 32 ears were observed to be noncholesteatomatous chronic suppurative otitis media. The average preoperative air conduction in the present study was found to be 46.6 dB ranging from 20 dB to 112.5 dB, while the average postoperative AC was found to be 39 dB with an average gain of 7.6 dB. The

frequency average preoperative and postoperative air-bone gap (ABG) were found to be 26.48 dB and 20.17 dB respectively, with the average gain of 6.3 dB. The average A-B gap closure within 0-30 dB was seen in 33 (82%) of the cases. Social hearing was achieved in 86% of the cases in type I, 46% in type II, and 40% in type III tympanoplasty.⁷ Indorewala *et al* reviewed a total of 789 tympanoplasties, with a male-to-female ratio of 1:1.1. In total, 91% and 9% of tympanoplasties were performed without and with mastoidectomy, respectively. Complete graft take was observed in 98.6% of cases. Approximately 25% of patients had an air-bone gap (ABG) gap ≤ 20 dB pre-operatively, increasing to 75.6% post-operatively. ABG closure improved from 0.8% to 46.7%. Mean ABG improved from 26.30 ± 8.1 dB pre-operatively to 14 ± 10.41 dB post-operatively ($t=28.7$, $P<0.001$). Generally, over 86% of patients had improvement in their hearing function post-operatively (mean = 12.5 ± 9.5 dB) ($\chi^2=104.2$, $P<0.001$).⁸ Shetty S studied 50 cases, of whom 45 (90%) were of Tubotympanic type of CSOM and 5 (10%) were of Atticoantral type of CSOM. 46 out of 50 (92%) have come to the normal range of hearing. The mean pre op hearing loss was 42.50 dB, and the mean post op hearing was 20.41. This is due to the fact that, in all cases graft was well taken up. Four cases out of 50 (8%), in which mild deafness persisted due to the residual perforation resulting from post op infections.⁹ Somashekara studied patients presenting with hearing loss, 40 (80%) with active discharge and 10 (20%) with no discharge. 36 (72%) patients had central perforation, 8 (16%) had attic perforation and 6 (12%) had marginal perforation. Comparing the preoperative and 3 months postoperative PTA, significant AB gap closure was seen in 30 (60%) patients, remained same in 18 (36%) patients and worsened in 2 (4%) patients. Maximum improvement (75%) was seen in the preoperative group 21-30 dB, in which of the 12 cases, 2 had a postoperative AB gap of less than 10 dB and 7 has a post op AB gap in the range 11-20 dB. The mean preoperative AB gap calculated was 37.2 ± 6.875 dB and the mean postoperative AB gap calculated was 27.08 ± 9.9 dB.¹⁰ Prasad V studied 51 patients with CSOM; 37 had TTD and 14 had AAD. Of the 37 patients with TTD, 35 patients had normal ETF and 2 of them had partial dysfunction. With normal ETF, the graft uptake rate was 80% compared to partial ETF which had only 50%. Patients with large and medium size mastoids had 89% of graft uptake. Patients with small and medium size perforations had 100% graft uptake; whereas large and subtotal perforations had 75% and 71.43% respectively. A total number of 34 tympanoplasties and 17 ossiculoplasties were done. Of these; 29 were type I and 5 were of type III. Out of 17 ossiculoplasties, 3 were

type b and 14 cases were of type d. We used 7 Gold and 7 Plastipore TORP for the type ossiculoplasty and PORP in 3 of the cases. Using temporal fascia as graft material 34 patients underwent tympanoplasty in whom the graft uptake was 79.41%, while 17 patients underwent ossiculoplasty using temporalis fascia as graft, the graft uptake was 88.23%. Tympanoplasty done for small and medium size perforations had 100% hearing improvement with A-B gap < 20 dB but patients who had large or subtotal perforations had 80% and 67% respectively. Hearing improvement to an A-B gap < 20 dB was noted in 91% and 60% following type I and type III tympanoplasty respectively. Hearing improvement to an A-B gap < 20 dB was noted in all the cases of type b ossiculoplasty and with typed ossiculoplasty (42%).¹¹ Hence it can be concluded that timely treatment of preformation with tympanoplasty can have a significant positive impact on the hearing status of the affected individual, which in turn may have a positive impact on recurrent infection rates and quality of life of the individual.

REFERENCES

1. Shrestha S, Sinha BK. Hearing results after myringoplasty. Kathmandu University medical journal (KUMJ). 2006;4(4):455-9.
2. Rupa V, Jacob A, Joseph A. Chronic suppurative otitis media: prevalence and practices among rural South Indian children. International Journal of Pediatric Otorhinolaryngology. 48(3):217-21.
3. Smyth GD. Tympanic reconstruction. Fifteen year report on tympanoplasty. Part II. The Journal of laryngology and otology. 1976;90(8):713-41
4. Zollner F. The principles of plastic surgery of the sound-conducting apparatus. The Journal of laryngology and otology. 1955;69(10):637-52.
5. Muqtadir Faiz RS. A study of hearing improvement gained after tympanoplasty using various methods in cases of CSOM. International Journal of Otorhinolaryngology and Head and Neck Surgery, [SI], v 4, n 1, p 107-111., dec. 2017. :4(1):5.
6. Kolo ES, Ramalingam R. Hearing Results Post Tympanoplasty: Our Experience with Adults at the KKR ENT Hospital, India. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India. 2014;66(4):365-8.
7. Gupta S, Kalsotra P. Hearing gain in different types of tympanoplasties. Indian Journal of Otolaryngology. 2013;19(4):186-93.
8. Indorewala S, Adedeji TO, Indorewala A, Nemade G. Tympanoplasty outcomes: a review of 789 cases. Iranian journal of otorhinolaryngology. 2015;27(79):101-8.
9. Shetty S. Pre-Operative and Post-Operative Assessment of Hearing following Tympanoplasty. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India. 2012;64(4):377-81.

10. K. G. Somashekara RKS, Siddharth Nirwan. A Study Of Hearing Improvement After Tympanoplasty By Means Of Pure Tone Audiometry. INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH. 2012;3(12):4.
11. Prasad V, Prasad KC, shenoy V, Raghavendra Rao A, Panduranga Kamath M, Sowmya V. A study of middle

ear reconstruction, the degree of functional restoration and causes of graft failure following chronic ear disease. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2014;15(2):103-8.

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