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Surgical Outcome in Paediatric Tympanoplasty: Our Experience

Dr. Abhinav Srivastava[1] , Dr. Chander Mohan[2]
(1Department of ENT/Rohilkhand Medical College& Hospital Bareilly,India)
(2 Department of ENT/Rohilkhand Medical College& Hospital Bareilly,India)

Abstract: *The aim of the Retrospective Study is to see the surgical outcome of Tympanoplasty in Paediatric age group in our Institute. The study includes a total of 50 children of age group 9 to 14 years, who underwent type I tympanoplasty in our Institute between January 2011 and December 2013. The children were divided in 2 groups, Group I of 20 cases ,which comprised of children less then 11 years and other as group II of 30 cases, which constituted children above 11 years. Patients who had adenoid hyperplasia, persistent U.R.T.I., those patients who had chronic squamosal disease of the same ear or who had any type of previous or concurrent ossicular chain reconstruction, were excluded from the study.*
In our study we have seen success rate i.e. graft uptake, was higher in Group II (90.3%) as compared to Group I(75%). and it was not found to be statistically significant (p> 0.05). Overall success was in 43 cases out of total of 50 cases (86%). Audiological improvement was seen in 40 (80%) cases.
Conclusion:Tympanoplasty is the best known modality of treatment of central perforation in children . However, results are better in children who are greater then 11 years of age .
Keywords: *Eustachian Tube Function, Graft uptake, Hearing Loss., Tympanoplasty, Hearing Disability*

I. Introduction

Tympanic membrane perforation is a known sequel of otitis media in children.Deciding which patients benefit from surgical repair and what is the optimal age to perform it continues to be widely debated. We used the definition of tympanoplasty type 1 according to Portmann [1]. The success rates of tympanoplasties in children reported in literature vary from 35% [2] to 92% [3,4].

Otologic surgery in children is regarded by many as being less successful than in adult patients. Problems associated with auditory tube dysfunction and the higher incidence of Upper Respiratory Tract Infections(U.R.T.I.), may be the reason for the evocated poorer tympanoplasty outcomes in children than those in adults [5]. So Age is considered as a key prognostic factor in evaluation for Tympanoplasty in Children[6].
However, the management of patients with persistent perforation of the tympanic membrane (TM), with or without intermittent otorrhea, incites considerable controversy. Some advocate early surgery to correct anatomic defects and improve hearing. Others maintain elective surgery should be deferred until the peak incidence of acute otitis media has passed.

The rationale behind performing tympanoplasty in children are compelling because of the good cochlear reserve in children, the potential for restoring and preserving hearing is high. Also tympanoplastic surgeries prevent sequelae of chronic otitis media like formation of cholesteatoma and hearing disability due to ossicular damage.
The aim of present study was to carry out a retrospective analysis of the results of tympanoplasty in children in a tertiary care hospital in western Uttar Pradesh, where the incidence of childhood otitis media is quiet high.

II. Material and Methods

The study includes a total of 50 children of age group 9 to 14 years, who underwent type I tympanoplasty in the department of Otolaryngology at Rohilkhand Medical College and Hospital, Bareilly between January 2011 and December 2013. The mean age at the time of operation was 12 years. The children were divided in 2 groups, **Group I** of 20 cases ,which comprised of children less then 11 years and other as **group II** of 30 cases, which constituted children above 11 years.
All the children had central perforations that had remained dry for a minimum period of 10 weeks with a good cochlear reserve as assessed by preoperative pure tone audiometry.
Patients who had adenoid hyperplasia, persistent U.R.T.I., those patients who had chronic squamosal disease of the same ear or who had any type of previous or concurrent ossicular chain reconstruction, were excluded from the study.
All the cases had undergone tympanoplasty by post aural route under general anaesthesia, Temporal Fascia was used as a graft material with underlay technique.
In all the cases detailed documentation regarding the size and site of perforation and a pre and post-op Pure Tone Audiometry at 3 months was evaluated.

Anatomical success was defined as the presence of an intact graft evaluated by microscopy at the last follow-up visit at 6 months.
Functional success was defined as a post-operative air bone gap (0.5-3 kHz) of <20 dB according to the committee on Hearing and Equilibrium Guidelines for the evaluation of results of treatment of conductive hearing loss(7).
Hospital stay was of seven day, using oral analgesic and antibiotics as required and keeping oral medication for two weeks after hospital discharge.

III. Results

In our study we have seen success rate i.e. graft uptake, was higher in Group II (90.3%) as compared to Group I(75%). (Table 1& Fig. 1) and it was not found to be statistically significant ($p > 0.05$). Overall success was in 43 cases out of total of 50 cases (86%). (Table 1 & Fig. 1)
Audiological improvement was seen in 40 (80%) cases (Table 2 & Fig. 2).
Amongst 40 (80%) audiologically improved cases, 23 (57.5%) cases had improvement of 10-15 dB air-bone gap , 17 (42.5%) cases had improvement of 15-20 dB air – bone gap (Table 3 & Fig. 3).
Other factors that contributed in the outcome of tympanoplasty were duration of ear discharge, period of inactivity, size of perforation, status of contralateral ear and condition of middle ear mucosa. We noticed a higher success rate when there is short duration of ear discharge, longer period of dry ear and the small size of perforation.

Out of 7 cases that had failed, 2 cases were found to have edematous middle ear mucosa at the time of surgery.
Also, out of these 7 cases that had failed, 3 cases had complete graft rejection at 1 month, 2 cases small residual perforation and 2 pinpoint perforation which healed after chemical cautery.
Also out of seven failure cases , none of the cases had worsening of hearing.

IV. Figures and table

Table 1

Age Group	No. of cases	Successful Cases	Failure Cases	Success Percentage
Group I (<11 years)	20	15	5	75%
Group II (>11 years)	30	28	2	90.3%
Total	50	43	7	86%

P value : 0.067; Not Significant

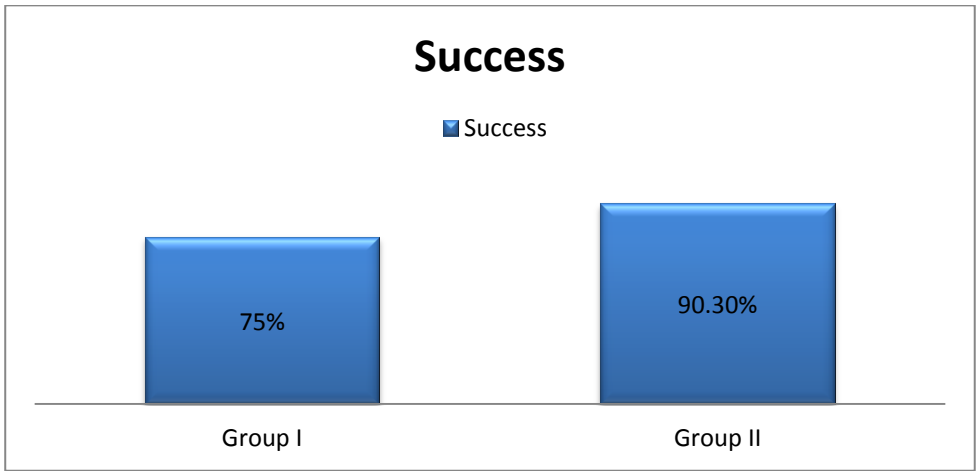

Fig.1 Comparision of two groups

Table 2

Cases	Status of Hearing	Percentage
40	Improved	80
10	No change	20

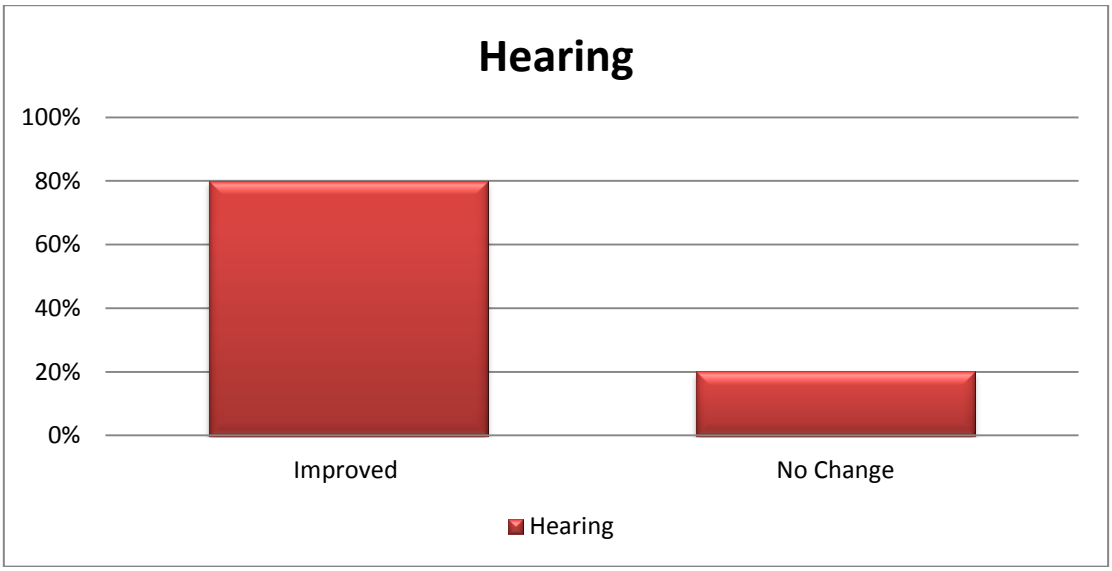

Fig. 2 Post Operative Hearing Status

Table 3

Audiological Improvement (A-B Gap,in dB)	No. of Patients	Percentage
10-15	23	57.5
15-20	17	42.5

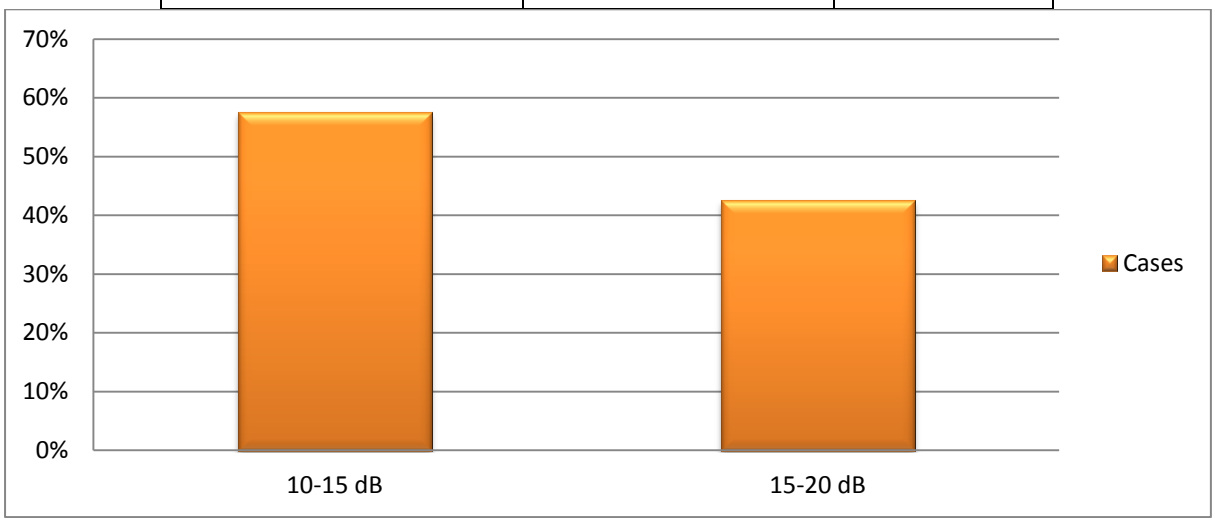

Fig. 3: Hearing Improvement in Terms of A-B Gap

V. Discussion

We see a lot of disparity in the surgical outcome in paediatric tympanoplasty which can be explained by differences in the inclusion and exclusion criteria and definitions of success and also on the status of Upper Respiratory Tract Infection.

Many studies have considered anatomical criteria as their success but a normally functioning middle ear after tympanoplasty requires more than an intact graft and that is the hearing gain. A stricter definition of success is used according to the American Academy of Otolaryngology Head and Neck Surgery guidelines(7).
Tympanic membrane perforation in children can cause significant disability and tympanoplasty is a simple and effective procedure that results in the successful closure of the perforation in most cases. However, there seems to be no consensus among otologists regarding the benefits of tympanoplasty in children.The rationale for operating early in children is 3-fold(4): (1) to prevent the possibility of chronic ear disease and its related complications; (2) to improve hearing without the need for a hearing aid and thus optimize one of the main conditions for speech and language development; and (3) to help the child enjoy water activities. On the other hand, persistent eustachian tube (ET) dysfunction, recurrent upper respiratory tract infections, technical

difficulty, and reperforation are the predominant arguments put forward for delaying the procedure until a certain age(9), which can vary from 10 to 14 years.

It is controversial as to when to operate the child. Glasscock(10) gave young age as a relative contraindication to tympanoplasty because children under three or four are prone to upper respiratory infections and otitis media. Koch et al(9) reported an 81% success rate for children age 8 and older, but only a 30% success rate in younger patients. They concluded that tympanoplasty before age 8 results in a high rate of failure because of poor Eustachian tube function and frequent URIs. Smyth(11) agreed, noting that patients less than 10 years old had a higher failure rate for tympanoplasty than older children. This was independent of secretion type, perforation site, and graft material.

However, Lau and Tos(3) found no significant difference in outcome between 2 to 7 age group and those children ages 8 to 14. They suggested that early operation may prevent progression of ossicular chain resorption. Ophir et al(18) reported a 79% overall success rate, and their success in younger children (5-8) was comparable to the rate for older children. They concluded that tympanoplasty had a good chance of success at any age. Kessler et al(4) reviewed the results of 209 myringoplasties and concluded that even in young patients (2-6 years) myringoplasty has a high success rate (75-94%), and that age alone could not be considered a contraindication to surgery.

Tympanoplasty results depends on the criteria for selection also on the duration of follow-up. If closure of perforation alone is taken as a measure of success, the rate is reported to be between 75% and 92%.This compares favorably with the results reported for the adult population(12,13). However, success rate can be as low as 45% if factors such as occurrence of OME, reinsertion of ventilation tubes, and atelectasis are considered measures of failure(9,14). Although involvement in water activities without recurrence of otorrhea are well-recognized benefits that improve the quality of life of children after tympanoplasty, there is as yet no scale to measure these benefits. It is therefore crucial to define the criteria of success in pediatric tympanoplasty, preferably internationally, to enable us to compare the results in a more meaningful way.

The present study was conducted on patients aged 9-14 years and the result of successful graft uptake was 86% which is comparable to the results of various authors(5,9,15,16).

The reason for variation in results of these authors could be attributed to the wide range of age that differs in various studies, because of technique used, varying length of follow up and experience of surgeons.

The post operative air-bone gap was less than 20 db in our study in 80% of cases comparable to other authors(16,17),while no change in hearing was noted in 12% cases and worsening in 8% cases.

VI. Conclusion

Tympanoplasty is the best known modality of treatment of central perforation in children . However, results are better in children who are greater then 11 years of age . Restoration of better hearing is also another reason for considering tympanoplasty at an early age as it prevents further hearing disability and acts as a modality for primary prevention.

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