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IP Journal of Otorhinolaryngology and Allied Science

Journal homepage: www.ipinnovative.com

Case Report

Successful paediatric tympanoplasy – An overview

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ARTICLE INFO

Article history:
Received 08-06-2020
Accepted 26-08-2020
Available online 24-10-2020

Keywords:
Ear discharge
Pediatric tympanoplasty
Perforation

ABSTRACT

Introduction: Paediatric tympanoplasty is regarded by many as being less successful than in adults due to higher incidence of otitis media. In our study, we are trying to determine the pre-operative conditions that influence the success of paediatric tympanoplasty and construct a prognostic index for the same.
Aims and Objectives: To determine which pre-operative conditions or surgical technique may influence the success of pediatric tympanoplasty and to construct a prognostic index for the same.
Materials and Methods: 40 children between 8-15 years were included in this prospective study between June 2018- August 2019 in Department of ENT, in our institution. Pure Tone Audiograms were recorded pre and post operatively.
Results: The positive outcomes measured were integrity of tympanic membrane, minimum of 10decibel gain in auditory threshold and air filled space in middle ear. Higher success rate was observed in cases with elder age group (12-15 years), shorter duration of ear discharge, longer period of dry ear and small size of perforation.
Conclusion: Tympanoplasty in children is a current and controversial theme. We have made a novice attempt to define factors that predict success or failure in paediatric tympanoplasty.

1. Introduction

Paediatric tympanoplasty is regarded by many as being less successful than in adults due to higher incidence of otitis media. It is a current and controversial theme. Previously reported success rates for paediatric tympanoplasty in children have ranged between 56% to 94%, with this wide range being attributed to different selection criteria and definitions of success.[1] The latter parameter traditionally have been measured only by the post-operative integrity of the grafts. There exist other valuable characteristics to consider, as it is known that children in general, and those who have undergone repair of the tympanic membrane, in particular , present a greater risk for retractions, serous otitis media, and reperforation with episodes of acute otitis media. In addition, with a paediatric population, the surgery itself may be considered as being more difficult technically, due to narrowness of the external ear canal and the generally smaller size of the ear, thus contributing to a poor result, but of a functional type.[2] Therefore, over time, otorhinolaryngologists dedicated to paediatric pathology have considered it necessary to have a more complete definition of " success "- one that should include 1) Integrity of the graft or membrane; 2) post-operative gain (minimum of 10 Decibel)in the auditory threshold, or conservation of hearing; and 3) complete healing with the space of the aerated middle ear manifested by the graft located in the correct anatomical position, with neither atelectasis nor otitis media with effusion.[3]

There are authors who are of the opinion that early surgery to be done to correct anatomic defects and improve hearing. Arguments in favor of surgery at an earlier age (under 5 years) are the following: 1) reduction in the number of visits to the doctor, which are required for the follow-

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https://doi.org/10.18231/j.ijoas.2020.025

up of a minor with perforated ear drum; 2) hypoacusis and privation of aquatic activities will affect the quality of life; 3) higher incidence of severe secondary complications due to chronic otitis media in younger children; 4) better cochlear reserve at younger ages, with greater potential to restore and preserve hearing; 5) limitation of the damage that chronic infection can cause to other structures in the middle ear; and 6) auditory loss that alters the development and the quality of academic activities.[4]

While others are of the opinion that elective surgery should be delayed , generally until 6 years of age. The support of the said arguments are the following aspects 1) alterations in the healing process or re-perforation of the graft by repeted infections of the upper respiratory tract; 2) unpredictable function of the Eustachian tubes; 3) immunological immaturity; 4) possibility of spontaneous resolution; 5) difficulty of post-operative care; 6) lack of confidence of the part of the parents in the procedure; and 7) equivalence of the function of the ventilation tube.

A number of attempts have been made to define those factors that predicts the success or failure in elective cases.[5] Some of the factors which received attention are age, surgical technique, status of the contralateral ear, duration of ear discharge, period of dry ear, size of perforation, presence of adenoids, presence of active infection, and function of the Eustachian tube.

In this case series, we are trying to define some factors which positively or negatively influence outcome.

2. Aims

1. To determine which pre-operative conditions or surgical techniques may influence the success of paediatric tympanoplasty.
2. To construct and validate a prognostic index that could be used as a tool to predict the success.

3. Materials and Methods

A prospective clinical study carried out on 40 children who undergone paediatric tympanoplasty from June 2018 to August 2019, at A.J. Institute of Medical Sciences, Mangalore, Karnataka.

3.1. Inclusion criteria

1. Children in the age group of 8-15 years.
2. Persistent unilateral or bilateral perforation of the tympanic membrane.
3. Dry ear since 6 months.
4. Good cochlear reserve.

3.2. Exclusion criteria

1. Children below 8 years and above 15 years.
2. Ear discharge within 6 months.
3. Prior ear surgery, atticoantral disease and ossicular necrosis.
4. Poor cochlear reserve.

Clinical examination, otomicroscopy done before the surgery and Pure tone audiometry recorded pre-operatively. Paediatric tympanoplasty done under general anesthesia using Post auricular approach by harvesting temporalis fascia and placement by Under lay technique. Post-operatively antibiotic given for 1 week months. The results were statistically analysed with Paired t test.

4. Results

23 male and 17 female children involved in the study. There are around 11 children between the age of 8-11 years and 29 between the age of 12-15 years.15 children of the study have ear discharge for 1-2 years and 25 have ear discharge for more than 2 years.15 children of the study have duration of dry ear for 6months to 1 year and 25 children have duration of dry ear for more than 1 year.31 children have size of ear perforation more than 50% and 9 children have size of ear perforation less than 50%.

Table 1: 1: Sex distribution

Sex	Frequency	Percentage
Male	23	57.5
Female	17	42.5
Total	40	100

Table 1, summarizes sex distribution of the study group, the total number of males in the study was 23 (57.5%) and total number of females was 17(42.5%)

Table 2: Age distribution

Age group (Years)	No. of cases	No. of successful cases
8-11	11(27.5%)	9 (81.8 %)
12-15	29(72.5%)	28(96.5%)
Total	40(100%)	37(92.5%)

Table 2 summarizes, among the age group 8-11 years, 9 tympanoplasty out of 11 successful (81.8%) and in the age group 12-15 years, 28 out of 29 successful (96.5%).

Table 3: Duration of ear discharge

Duration of Ear discharge (years)	No. of Cases	No. of Successful cases
<2	15(37.5%)	14 (93.3%)
>2	25 (62.5%)	23 (92%)
Total	40(100%)	37(92.5%)

Table 3 summarizes, among 15 cases with history of ear discharge since 1-2 years, tympanoplasty was successful in 14(93.3%) and 25 cases with history of ear discharge for more than 2 years, 23(92%) had successful outcome

Table 4: Period of dry ear

Period of Dry ear	No. of Cases	No. of Successful cases
6 months to 1 year	15 (37.5%)	10 (66.6%)
more than 1 year	25 (62.5%)	23 (92%)
Total	40(100%)	33 (82.5%)

Table 4 summarizes, the duration of having dry ear was between 6 months- 1 year in 15, and more than 1 year in 25. The surgical outcome was favourable in 10(66.6%) and 23(92%) respectively.

Table 5: size of perforation

Size of perforation	No. cases	Percentage
Less than 50 percent of surface area	31	77.5
More than 50 percent of surface area	9	22.5
Total	40	100

Table 5 summarizes, 31(77.5%) had central perforation occupying less than 50% of the surface area and 9(22.5%) had more than 50% of the surface area.

5. Discussion

Tympanoplasty in adult population has established itself as an effective and rewarding operation. Considerable controversy surrounds the subject of tympanoplasty in children. The reluctance is due to the opinion that a child has a higher susceptibility to Upper Respiratory Tract Infections. The rationale for operating early in children is 3 fold 1) to prevent the possibility of ear infections and complications 2) to improve the hearing with a positive impact on language, learning and socialization 3) to enjoy the water activities.[6]

Three positive outcomes measured: 1) Anatomical success- Presence of an intact tympanic membrane evaluated by microscopy and/or tympanometry at 6 months. 2) Physiological success- Minimum of 10 decibel gain in auditory threshold 3) Air filled space in middle ear based on Pure Tone Audiometry and Tympanometry.

Higher success rate in 1) elderly age group (12-15 years)- Poor Eustachian tube function has been attributed for less successful outcome in younger age group (8-11years) 2) Shorter duration of ear discharge (1-2 years), 3) Longer period of dry ear (> 1 year) and 4) Small size of perforation (<50%). Our study substantiates these findings.[7]

6. Conclusion

Tympanic membrane perforation is a known sequela to Otitis media in children. Deciding which patient benefit from surgical repair and when is the optimal age to perform it continues to be widely debated.[8]

This study shows that tympanoplasty is a valid treatment modality for tympanic membrane perforation in paediatric population.[9]

Our study emphasizes on greater success rates in older children, with shorter duration of ear discharge, longer period of dry ear and small size of perforation.[10]

7. Source of Funding

None.

8. Conflict of Interest

None.

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Cite this article: Thantry D, Raj K V, Mahesh S G, Devan PP, Bhandary R, Pai VK. **Successful paediatric tympanoplasy – An overview**. *IP J Otorhinolaryngol Allied Sci* 2020;3(3):117-119.