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Allergic Rhinitis Role in the Success of Tympanoplasty

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Abstract: ***Background: The purpose of this study was to investigate the role of allergic rhinitis in the success of tympanoplasty. Methods: The study was prospective and the study population was selected from patients admitted for middle ear pathology in ENT ward at Sri Aurobindo Medical College & PG Institute, Indore. Total 40 patients, 20 from each group (AR-allergic rhinitis; NAR- nonallergic rhinitis) were undergone through type1 tympanoplasty. Results: Success rate of tympanoplasty was measured in terms of Graft uptake rate, which was 90% in NAR group and 80% in AR group. However, the difference between groups was not statistically significant (p=.747). Conclusions: These findings suggest that allergic rhinitis decreases the graft uptake rate, although a statistically significant difference was not found. Prospective studies with larger patient groups with long-term follow-up are required in order to evaluate this pathology.***

Keywords: Allergic rhinitis, Chronic otitis media, Graft uptake rate, Middle ear pathology, Tympanoplasty

1. Introduction

In 1953 Wullstein and Zollner [1] introduced the term tympanoplasty to describe surgical techniques for reconstruction of the middle ear hearing mechanism that has been impaired or destroyed by chronic ear disease. Currently, various graft materials like temporalis fascia, tragal cartilage, perichondrium, etc. and different surgical techniques like underlay, interlay & overlay are used for repair of tympanic membrane[2]-[4]. The success rate is affected by various factors such as perforation size, middle ear pathology, eustachian tube dysfunction, technique used for graft placement.

Eustachian tube dysfunctions, diseases of nasal mucosa and nasopharynx have a great impact on middle ear and mastoid [5]-[10]. It is clear from previous studies that allergic rhinitis affects nasal mucosa and eustachian tube functions [5]-[9]. In numerous studies, it was shown that there is an increase in allergic rhinitis prevalence in patients with chronic otitis media with effusion [11],[12]. The worldwide prevalence of allergic rhinitis in children has been estimated to be 20% [12]. Prevalence figures for allergic rhinitis have vary widely from .8 to 39.7 percent [13]-[15]. Despite allergic rhinitis affects middle ear pathology, it's a role in the success of surgery for chronic otitis media has not been much studied. Allergic rhinitis is defined clinically by a combination of two or more nasal symptoms: running, blocking, itching and sneezing. It's an IgE-mediated inflammatory response following exposure to an allergen. Laboratory tests are helpful in diagnosis.

2. Methods

The study was conducted at the Department of Otorhinolaryngology, Sri Aurobindo Medical College & PG Institute, Indore, in a 6month duration of September 2019 to February 2020. 40 patients were selected on an IPD basis; out of which 20 patients were presented as chronic otitis media with allergic rhinitis (AR group), while the other 20 patients were presented with chronic otitis media with no sign & symptoms of allergic rhinitis.

Inclusion criteria:

- Patients presented with a safe type of chronic otitis media.
- Patients aged 15-60 years of either sex.
- Patients having small to large-sized central perforation.
- Patients having a non-discharging ear.
- Patients were allergic symptoms who never received treatment for allergic rhinitis.

Exclusion criteria:

- Patients presented with unsafe chronic otitis media.
- Patients having an ossicular chain defect.
- Patient with total or subtotal perforation.
- Patients aged either <15years or >60 years.
- Patients with discharging ear.

A detailed history was taken from all patients. Patients were evaluated by otoscopic & microscopic examination. Pre-operative PTA and laboratory tests including all routine investigations and tests for allergy like serum IgE level & skin prick test were carried out. All of the patients had pre-operative temporal CT examinations and those with mastoid pathology were excluded from the study.

Pre-operative antibiotics were given to all patients. After xylocaine sensitivity test with the status of nil per orally for at least 6 hours, all 40 patients were undergone type1 tympanoplasty under local anesthesia along with intravenous sedation. Temporalis fascia was harvested as graft and placed via underlay technique by post-aural approach. All patients were discharged next day of surgery.

All patients received painkillers and antibiotics post-operatively for 7 days. None of the patients received treatment for allergy. The mean follow-up period was 6 months. Patients were called first at post-op 7th day for removal of sutures & mastoid dressing, then at post-op 21st

day; remaining gel foam in EAC were removed and graft uptake recorded. After that patients were followed-up at post-op 1st, 3rd& 6th month. Post-op PTA was carried out at the 1st& 3rd month. The success of surgery measured in terms of graft uptake rate.

Statistical analysis

The statistical software SPSS version 16 has been used for the analysis. An alpha level of 5% has been taken, i.e. if any p-value is less than 0.05 it has been considered as significant and a p-value of <0.001 was considered highly significant for the entire test.

Continuous variables are expressed as mean±standard deviation. The mean differences between groups were compared by Student's t-test. Categorical data were analysed by Pearson's Chi-square.

3. Results

In patients undergoing tympanoplasty operation, demographical characteristics and middle ear pathologies were similar. When the groups were examined in terms of demographical properties; no statistically significant difference was observed (p > 0.05) (Table 1). No statistically significant difference was found between the groups in terms of gender, age, follow-up period (6month), etc.

Table 1: Demographical characteristics.

Variables	NAR (n=20)	AR (n=20)	P Value
Mean Age (years)	35±10.2	37±13.3	.597
Gender			.342
Male	12(60%)	9(45%)	
Female	8(40%)	11(55%)	

Both the NAR group & AR group had a significant statistical difference in average PTA value between before surgery and 3 months after surgery (Table 2). For NAR group; pre-op PTA value 28.92±7.47 dB HL & post-op PTA value 19.47±11.69 dB HL; that was significant (p < .05). Similarly in AR group pre-op & post-op PTA value were following; 30.08±11.69 dB HL &17.17±7.98 dB HL; that was also significant data (p < .05).

Table 2: Pre-op & post-op Audio logical assessment.

	NAR (n=20)	AR (n=20)	P Value
Pre-op PTA	28.92±7.47	30.08±11.69	<.001
Post-op PTA	19.17±4.66	17.17±7.98	<.001

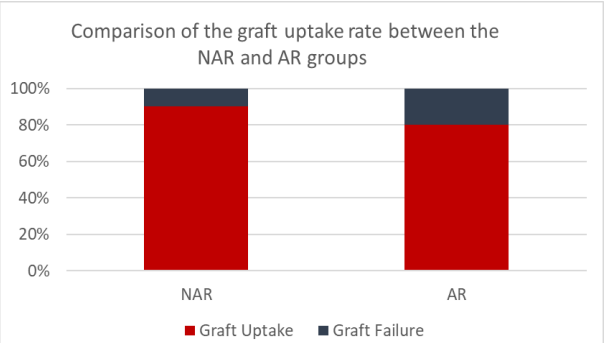

Figure 1: Graft uptake rate

Graft uptake rates of 20 patients in the AR group who underwent type1 tympanoplasty was 80% (16 patients) while in the NAR group it was 90% (18 patients) (Figure 1). The success rate of both groups was comparable but statistically insignificant (p = .747). Graft failure rates were 20% (residual perforation in 1 patient and 3 patients with re-perforation) in the AR group. On comparison in the NAR group; the graft failure rates were 10% (residual perforation in 1patient and re-perforation in 1 patient).

4. Discussion

Prevalence of allergic rhinitis in the population varies between .8% and 39.7% [13]-[15]. Because of its high prevalence and its negative impact on the middle ear mucosa through eustachian tube, its role in success of chronic otitis surgery should be investigated. It should be considered as a factor in surgery planning and evaluation of success criteria. Success rates in tympanoplasty still show variance despite various operation techniques and different grafts [4],[5],[19]. Success rates in the literature vary depending on various factors such as the perforation size, middle ear pathology, chronic tubal dysfunction, technique applied, number of cases, follow-up period, pre-op & post-op infection, etc. Eustachian tube plays an important role in ventilation of the middle ear and mastoid. In allergic rhinitis released various chemical mediators affect nasal and nasopharyngeal mucosa and eustachian tube functions through different mechanisms [5]-[10]. Mediators and cytokines released during allergic reactions cause nasal and nasopharyngeal edema and hypersecretion, leading to eustachian dysfunction [7]-[9],[11].

In the study of Pelikan et al[11], it was shown in 87 patients with chronic secretory otitis media that nasal allergy affects eustachian tube functions and middle ear pressure changes, causing deterioration of hearing functions.

In the study of Alles et al [12] performed in 209 children with chronic otitis media with effusion; the prevalence of allergic rhinitis was found to be 89%. The role of allergy in otitis media with effusion can be correlated to various mechanisms. Exposure of middle ear mucosa to an allergic reaction, nasal and nasopharyngeal inflammation, obstruction and hypersecretion, edema occurring in the eustachian tube and transmission of the bacteria from the nasopharynx to the middle ear via hypersecretion due to allergic reaction are the essential factors. Diagnosis of allergic rhinitis is made via; typical allergic symptom history and diagnostic tests[16]. Diagnostic laboratory tests are in vivo (serum IgE, nasal & blood eosinophilia, etc.) and in vitro (skin tests) tests [16].

Graft uptake rate in the literature show variability [3],[19]. After 24-months of follow-up; Cabra et al. [3] found a success rate of 82% in the patients subjected to palisade cartilage tympanoplasty and 64% in the patients subjected to fascia tympanoplasty. Lacovou et al. [17] have reported a success rate of 97.2% in their study in 2014 performed by using cartilage graft. Cavaliere et al. [4] have reported a 100% success ratio in tympanoplasty performed by using cartilage shield graft in the study consisting of 236 patients.

These findings suggest that allergic rhinitis decreases the graft uptake rate in pathologies occurring in the nasal mucosa, eustachian tube, middle ear, and mastoid, although a statistically significant difference was not found. Studies with a higher number of patients can show a statistically significant difference. This pathology should be investigated in chronic otitis media surgery because of its active role in the pathogenesis of secretory otitis media which has high prevalence [11]-[13]. Studies with a larger number of cases for long follow-up are also recommended to check graft survival and long-term auditory results.

5. Conclusion

These findings suggest that allergic rhinitis decreases the graft uptake rate although a statistically significant difference wasn't found. Prospective studies with larger patient groups with long term follow-up are required in order to evaluate this pathology that influences middle ear and mastoid bone considerable.

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