Int. J Med. Pharm. Res. (P-ISSN: 2958-3675 | E-ISSN: 2958-3683)
Available on: https://ijmpr.in/

International Journal
of Medical and Pharmaceutical Research

ORIGINAL ARTICLE **OPEN ACCES**

EFFECT OF DEVIATED NASAL SEPTUM ON TYMPANOPLASTY GRAFT UPTAKE

Acharya Souvagini[1], Agasti Swati[2], Panda Sujata[3], Agrawal Priyanka[4], Kar Suman[5], Sarangi Shakti Prasad[6]

[1]Professor and HOD, Department of ENT and HNS, VIMSAR, Burla
[2]Postgraduate, Department of ENT and HNS, VIMSAR, Burla
[3]Associate Professor, Department of ENT and HNS, VIMSAR, Burla
[4]Senior Resident, Department of ENT and HNS, VIMSAR, Burla
[5]Postgraduate, Department of ENT and HNS, VIMSAR, Burla
[6]Postgraduate, Department of Pharmacology, VIMSAR, Burla

OPEN ACCESS

***Corresponding Author**
Dr Swati Agasti
Postgraduate, Department of ENT and HNS, VIMSAR, Burla

Received: 10-01-2025
Accepted: 22-02-2025
Available online: 27-02-2025

A B S T R A C T

BACKGROUND: Chronic suppurative otitis media (CSOM) is commonly treated with tympanoplasty, which has a reported success rate of 85-90%. Success is influenced by various factors, including graft material and surgical technique. The Eustachian tube, vital for middle ear function, can be affected by nasal issues such as deviated nasal septum (DNS), which may impact middle ear ventilation. DNS prevalence is around 22.83%, leading to questions about its effect on tympanoplasty outcomes.

MATERIALS AND METHODS: A prospective study was conducted on 50 CSOM patients, divided into two groups based on DNS presence (25 with DNS, 25 without). Patients underwent tympanoplasty using the underlay technique with temporalis fascia graft and were followed for six months to assess graft uptake through otoscopy, microscopy, and audiometry.

RESULTS: No significant differences in hearing gain (p=0.3) or graft uptake (p=0.13) were found between the two groups. The A-B gap(air-bone gap) also showed no significant difference (p=0.08).

CONCLUSION: The study suggests that DNS may not significantly affect tympanoplasty outcomes, challenging the need for pre-tympanoplasty septoplasty. Larger studies are recommended for further exploration.

Key Words: Tympanoplasty, Deviated Nasal Septum, Chronic Suppurative Otitis Media, Graft Uptake, Eustachian Tube Dysfunction, Hearing Gain

INTRODUCTION

Chronic suppurative otitis media is a common condition causing ear discharge and hearing loss. Tympanoplasty, a surgical procedure, aims to eliminate middle ear disease and reconstruct the hearing mechanism (Worldwide Journals, 2014).

Tympanoplasty has a reported success rate of 85-90%. Its outcomes are influenced by factors such as graft material choice, surgical technique, surgeon expertise, and the presence of systemic conditions like diabetes or obstructive Eustachian tube dysfunction. (Tan et.al.,2015)

The Eustachian tube plays a crucial role in pressure equalization, mucosal gas exchange, and middle ear ventilation (Al Karaki et.al.,2020).

Concurrent nasal issues such as sinusitis, allergies, adenoid enlargement, nasopharyngeal masses, tobacco smoke exposure, reflux, cleft palate, radiation therapy, and deviated nasal septum, can contribute to or exacerbate middle ear problems through ET dysfunction (Schuman et.al., 2010).

The prevalence of nasal septal deviation is around 22.83% in adults and it affects middle ear ventilation, and raises nasal airflow resistance altering the threshold pressure for Eustachian tube opening (Al Karaki et.al.,2020, Akyıldız et.al.,2018).

Debates exist on the effect of septal deviation on tympanoplasty which will be studied here. Some surgeons recommend septoplasty before tympanoplasty, but consensus within the medical community is lacking (Tan et.al.,2015).

OBJECTIVES-

To compare the graft uptake and improvement in hearing after tympanoplasty in patients with and without deviated nasal septum.

METHODOLOGY

A prospective study was conducted in the Department of ENT, VIMSAR, Burla taking the 50 patients who were admitted between June 2022 and May 2023 and underwent tympanoplasty among which 25 had DNS(Group-2) and 25 didn't have it(Group-1). Convenience sampling method was applied.

INCLUSION CRITERIA-

- Patients of age group 18-60 years
- Middle Ear Risk Index (MERI) score of 1 (dry perforation, no cholesteatoma, normal ossicular status, no middle ear granulations, and no history of previous surgery)
- Who underwent tympanoplasty (with underlay technique using the temporalis fascia graft)

EXCLUSION CRITERIA-

- Age less than 18 years and more than 60 years
- Pregnant patients
- CSOM with atticoantral diseases and complications
- smoking, upper airway infections, patients with bilateral COM.
- nasal pathologies like sinonasal polyp, concha bullosa, nasopharyngeal mass
- History of surgeries such as septoplasty, endoscopic nasal surgery or tympanoplasty.
- with comorbidities like diabetes mellitus, chronic kidney disease, liver diseases, asthma

The presence of DNS was evaluated in CSOM patients before tympanoplasty by history, rhinoscopy, and nasal endoscopy. Clinical examination by otoscopy, examination under a microscope, pure tone audiometry, haemogram, X-ray bilateral mastoid (Schuller's view), x-ray PNS(Water's view), and CT scan nose and PNS were done.

. With otoscopy and examination under microscope the size of perforation and location according to quadrants were noted. Only patients with dry ears were selected for tympanoplasty.

The patients were followed up after 3 months with the otoscopic examination, examination under a microscope (EUM), and pure tone audiogram (PTA) to evaluate the graft uptake and hearing improvement.

Tympanoplasty success was evaluated anatomically by graft integrity and a dry ear. Functional success was evaluated by achieving an air-bone gap of ≤20 dB, indicating improved hearing

The criteria recommended by the Japan Clinical Otology Committee for calculations of hearing improvement (Tai, 1998) were used (Worldwide Journals, 2014).

- Patients with postoperative hearing within 40dB
- Hearing gain exceeding 15dB
- Postoperative A-B gap within 20dB

Data entry and analysis were done by using MS EXCEL version 2021 and Chi Square test was used.

RESULTS

50 patients underwent tympanoplasty by using temporalis fascia The group-1 consisted of 48% (12) male patients and 52% (13) female patients. The group-2 consisted of 56% (14) male patients and 44% (11) female patients. The mean age in Group 1 and Group 2 were 31.9+/-8.9 and 32.8+/- 7.3 respectively.

Most of the patients were of the 21-30 years age group as evident from Figure-1(pie chart)

Figure 1-Distribution of patients according to age groups

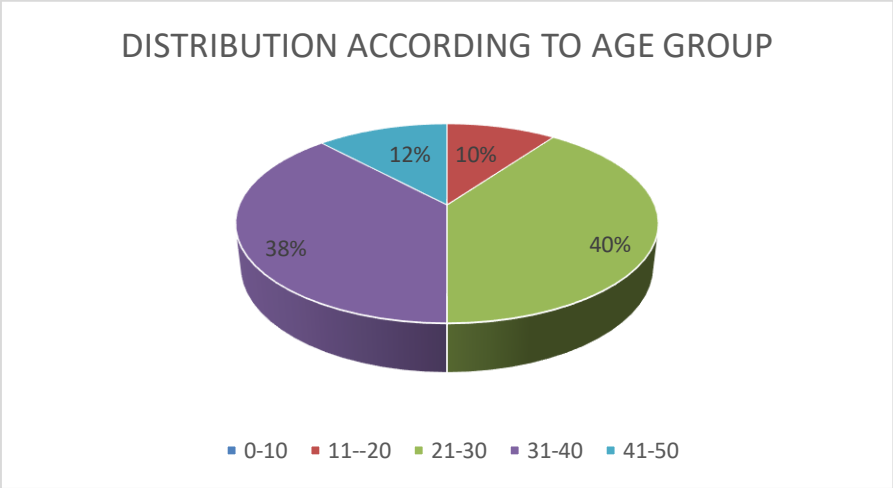

Table 1: Postoperative hearing gain in Group 1 and Group 2

Hearing gain	<15dB hearing gain	>15dB hearing gain	p = 0.3
Group 1	12(48%)	13(52%)	
Group 2	15(60%)	10(40%)	

The table (1) shows no significant difference in hearing gain between patients with and without deviated nasal septum (DNS) after tympanoplasty (p = 0.3). DNS did not significantly impact post-operative hearing improvement.

Table 2: Postoperative A-B Gap in Group 1 and Group 2

Post-op A-B Gap	</=20dB A-B Gap	</=20dB A-B Gap	p= 0.15
Group 1	17(68%)	8(32%)	
Group 2	12(48%)	13(52%)	

The table (2) shows no significant difference in post-operative air-bone (A-B) gap closure between patients with and without deviated nasal septum (DNS) after tympanoplasty (p = 0.15). DNS did not significantly affect A-B gap outcomes.

Table 3: Anatomical success in Group 1 and Group 2

	Group 1	Group 2	p=0.13
Anatomical success(graft uptaken)	19(76%)	14(56%)	
Anatomical failure(graft not uptaken)	6(24%)	11(44%)	

The table(3) shows no significant difference in graft uptake success between patients with and without deviated nasal septum (DNS) after tympanoplasty (p = 0.13). DNS did not significantly affect graft uptake outcomes.

Table 4: Functional success in Group 1 and Group 2

	Group 1	Group 2	p =0.08
Functional Success	18(72%)	12(48%)	
Functional failure	7(28%)	13(52%)	

The table (4) shows no significant difference in functional success between patients with and without deviated nasal septum (DNS) after tympanoplasty (p = 0.08). DNS did not significantly impact functional outcomes.

DISCUSSION

Tympanoplasty is the preferred surgical approach for dry central perforations, and its success can be influenced by various factors (Tan et.al.,2015). Limited research exists on how a deviated nasal septum affects tympanoplasty outcomes.

There are a few theories, those link nasal obstruction to Eustachian tube (ET) dysfunction. The Bernoulli principle explains that airflow through an obstructed nasal passage becomes turbulent, creating negative pressure in the nasopharynx and affecting ET function. As per the Sniff theory, inadequate nasal airflow enhances negative pressure in the nasal cavity, causing air to be drawn from the middle ear. The Toynbee phenomenon explains that during swallowing, blocked nasal passages lead to abnormal pressure fluctuations in the nasopharynx, affecting ET function. Additionally, nasal mucosal edema, often due to septal deviation, can lead to ET dysfunction (Akyıldız et.al.,2018). ET dysfunction leads to middle ear mucosal hypertrophy or discharge ultimately causing failure of tympanoplasty graft uptake (Bayram et.al.,2020).

Deron et al. Salvinelli et al., Kaya et.al. reported improved ET function after septoplasty(Kaya et.al.,2018, Deron et.al.,1995 , Salvinelli, et.al.2005). Maier and Krebs recommended septoplasty before tympanoplasty while Tan et al did not recommend it (Kaya et.al.,2018). Tympanoplasty success is evaluated anatomically by graft integrity and a dry ear. Functional success is by achieving an air-bone gap of ≤20 dB, indicating improved hearing. Both aspects are crucial for overall success (Bayram et.al.,2020).

In our study, the association of graft uptake and hearing gain after tympanoplasty with deviation of nasal septum (DNS) was not statistically significant.

Being a prospective study, it allowed a more controlled assessment of outcomes, reducing recall bias and enhancing data reliability. The inclusion of criteria, such as age range (18-60), Middle Ear Risk Index score of 1, and the use of the underlay technique with temporalis fascia graft, ensured a consistent patient population. The study directly compared two distinct groups (with and without DNS), providing a clear evaluation of the impact of DNS on tympanoplasty outcomes. The use of a plethora of diagnostic tools for evaluation strengthened the accuracy in assessing DNS and tympanoplasty outcomes. A six-month follow-up provided sufficient time to observe the effects of tympanoplasty and graft uptake, as a result enhanced the reliability of the findings.

On the other hand, the sample size of 50 patients is relatively small, which limited the generalizability of the results and may reduce the power to detect small differences. Conducting the study at a single institution may limit the external validity, as findings may not be representative of other populations or healthcare settings. The lack of statistically significant differences in graft uptake and hearing gain may be due to the small sample size, making it harder to draw definitive conclusions about the relationship between DNS and tympanoplasty outcomes. While the study focuses on DNS and its impact on tympanoplasty, it does not explore degree of DNS and other nasal or systemic factors that could affect Eustachian tube function and middle ear health.

Further research with larger, multi-centre studies are needed to provide more definitive evidence on the relationship between DNS and tympanoplasty outcomes.

CONCLUSION

Study findings suggest that nasal septal deviation may not impact the success of tympanoplasty, leading to the conclusion that pre-tympanoplasty septoplasty might be unnecessary. However, due to the limited number of existing studies on this topic, additional research, particularly with larger sample sizes, is recommended for better understanding.

REFERENCES

1. Worldwide Journals. (2014, December). *Recent issues*. Retrieved November 5, 2023, from https://www.worldwidejournals.com/paripex/recent_issues_pdf/2014/December/December_2014_1418652926__12.pdf
2. Tan, M., Kalcioglu, M., Akarcay, M., Toplu, Y., & Karaca, S. (2015). Does nasal septal deviation affect the success of tympanoplasty surgery? *West Indian Medical Journal, 64*(4), 393–396.
3. Al Karaki, V., Hallit, S., Nacouzi, M., & Rohayem, Z. (2020). Is there a relationship between Eustachian tube dysfunction and nasal septal deviation in a sample of the Lebanese population? *Head & Face Medicine, 16*(1), 23. https://doi.org/10.1186/s13005-020-00244-9
4. Schuman, T. A., & Labadie, R. F. (2010). Concurrent nasal surgery and tympanoplasty in adults. *Ear, Nose & Throat Journal, 89*(10), E28–E32.
5. Akyıldız, M. Y., Özmen, Ö. A., Demir, U. L., Kasapoğlu, F., Coşkun, H. H., Basut, O. İ., et al. (2018). Should nasal function be considered prior to tympanoplasty? *Journal of International Advanced Otology, 14*(1), 53–57.
6. Bayram, A., Bayar Muluk, N., Cingi, C., & Bafaqeeh, S. A. (2020). Success rates for various graft materials in tympanoplasty – A review. *Journal of Otology, 15*(3), 107–111.
7. Kaya, M., Dağlı, E., & Kırat, S. (2018). Does nasal septal deviation affect the Eustachian tube function and middle ear ventilation? *Turkish Archives of Otorhinolaryngology, 56*(2), 102–105.

8. Deron, P., Clement, P. A., & Derde, M. P. (1995). Septal surgery and tubal function: Early and late results. *Rhinology*, *33*(1), 7–9.
9. Salvinelli, F., Casale, M., Greco, F., D'Ascanio, L., Petitti, T., & Di Peco, V. (2005). Nasal surgery and Eustachian tube function: Effects on middle ear ventilation. *Clinical Otolaryngology*, *30*(5), 409–413.