

Correlation of Taste Sensation and Status of Chorda Tympani Nerve in Middle Ear Surgery

¹Surabhi Jaiswal, Kanti Devi Medical College, Hospital & Research Center, Mathura, U.P.

²Piyush Kant Singh, Kanti Devi Medical College, Hospital & Research Center, Mathura, U.P.

³Aanieq Moghal, Kanti Devi Medical College, Hospital & Research Center, Mathura, U.P.

⁴Parvathy PK, Kanti Devi Medical College, Hospital & Research Center, Mathura, U.P.

Corresponding Author: Surabhi Jaiswal, Kanti Devi Medical College, Hospital & Research Center, Mathura, U.P.

Citation this Article: Surabhi Jaiswal, Piyush Kant Singh, Aanieq Moghal, Parvathy PK, “Correlation of Taste Sensation and Status of Chorda Tympani Nerve in Middle Ear Surgery”, IJMSIR - June – 2025, Vol – 10, Issue - 3, P. No. 55 – 61.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: To Evaluate the correlation of taste sensation and status of chorda Tympani nerve in middle ear surgery intraoperatively and taste sensation of patient was reassessed post operatively on 1st, 3rd and 6th week of follow-up.

Aims and Objectives

Aim: To Study the Correlation of Taste Sensation and status of Chorda Tympani nerve in middle ear surgeries.

Objectives

- To observe frequency and types of chorda tympanic nerve injury during middle ear surgery.
- To Assess types of post-operative taste disturbances and their functional recovery.
- To assess the relationship between taste recovery and status of chorda Tympani nerve in middle ear surgery.

Material & Methods

A prospective observational study was conducted at KD Medical College Hospital & Research Centre in Mathura, Uttar Pradesh, focusing on 100 patients, assessing the chorda tympani nerve status intraoperatively and

evaluating postoperative taste sensations at 1st, 3rd and 6th weeks of follow up.

Based on chorda tympani nerve, patients were divided into the following groups:

GROUP I - Seen but not handled.

GROUP II - Handled but not stretched

GROUP III - Stretched but intact.

GROUP IV - Cut

For taste Assessment three kinds of taste testing solutions have been prepared with varying degrees of concentration: -

1. Sour (Citric Acid at 0.01, 0.05, 0.25 gm/ml)
2. Salty (Sodium Chloride at 0.009, 0.015, 0.03 gm/ml)
3. Sweet (Dextrose at 0.05, 0.10, 0.25gm/ml)

Scoring will be done to indicate when each patient recognizes a taste testing solution correctly. Scores for successful identification will be as follows: -

- | | |
|---|---|
| 1. Inability to identify the taste | 0 |
| 2. Highest concentration | 1 |
| 3. Intermediate concentration | 2 |
| 4. Lowest concentration of taste solution | 3 |

Result

Groups I and II maintained a mean taste sensation score of 3, showing no impairment. Group III exhibited significant recovery, with scores rising to 2.94, suggesting near-full taste function. Group IV, initially the most impaired, improved to 1.5 but remained the lowest. Despite some recovery, 75% of Group IV experienced taste impairment, and 7.14% showed no recovery after six weeks. Recovery was possible even after excessive stretching in Group III compared to nerve transection in Group IV.

Conclusion

Minimal handling and mild stretching had little impact on taste, while excessive stretching (Group III) led to impairment in 5.8% of patients. In contrast, nerve transection (Group IV) caused impairment in 75% of patients. The study found that chorda tympani nerve injuries do not always result in proportionate long-term taste disturbances, likely due to compensatory mechanisms and partial nerve recovery, while 1 patient did not recover completely in group III, 7.14% showed no recovery in group IV after six weeks. The Spearman rank correlation coefficient of -0.95 indicated a strong negative correlation between injury severity and taste function, highlighting the need for follow-up in severely affected patients.

Keywords: Chorda tympani, middle ear surgery, Taste sensation, recovery of taste, Facial nerve.

Introduction

The chorda tympani nerve (CTN), branch of the facial nerve (cranial nerve VII), plays a dual role in providing special sensory innervation for taste to the anterior two-thirds of the tongue and parasympathetic innervation to the submandibular and sublingual salivary glands. Its anatomical course through the middle ear cavity—where it passes between the malleus and incus and exits via the

petrotympanic fissure—renders it particularly vulnerable to injury during middle ear surgeries. Procedures such as tympanoplasty, mastoidectomy, ossiculoplasty, and other middle ear surgeries often involve regions in close proximity to the CTN, making its preservation and challenging. Postoperative complications, including dysgeusia, hypogeusia, or ageusia, are frequently reported, with 40–50% of patients experiencing taste disturbances immediately post-surgery and 5–15% continuing to report deficits long-term.^{1,2}

Mastoidectomy increases the likelihood of CTN damage, especially when combined with tympanoplasty or in cases of extensive disease. Cholesteatoma surgeries, where the CTN is often encased or adherent to pathological tissue, present an even higher risk of nerve injury. Postoperative dysfunction rates range from 40% temporary disturbances to 20% long-term symptoms.^{2,3}

Similarly, procedures like stapedectomy and ossiculoplasty involve manipulation of middle ear structures near the nerve, further increasing the likelihood of injury.

The mechanisms of CTN injury during middle ear surgery are multifactorial. Stretching of the nerve during ossicular chain manipulation can lead to ischemic neuropathy or demyelination, causing temporary or permanent dysfunction. Transection of the nerve, often necessary in cases of extensive cholesteatoma or chronic inflammation, results in severe and often irreversible deficits⁴

Additionally, thermal damage from drills or cautery devices can cause significant nerve injury, particularly in cases where the CTN is dehiscant. Chronic inflammation or mechanical compression, common in conditions such as chronic otitis media, further predisposes the nerve to intraoperative damage.³

Patient-specific factors such as age and systemic health also impact recovery. Younger patients typically recover more quickly and completely due to greater neuroplasticity, while older individuals may experience prolonged or permanent dysfunction due to reduced regenerative capacity⁵

Recovery following middle ear surgery depends on the extent of nerve involvement during the procedure. If the chorda tympani nerve remains intact or only slightly manipulated, taste disturbances are often temporary and resolve within a few weeks to months as nerve function gradually returns. Patients may experience mild metallic or bitter tastes, but these sensations typically diminish as nerve regeneration occurs. Proper postoperative care, including hydration, balanced nutrition, and avoidance of irritants like spicy foods, can aid in a smoother recovery. Additionally, patients should be reassured that temporary taste alterations are common and often improve with time.⁵

This study gives a comprehensive analysis of the correlation between CTN status and taste sensation in the context of middle ear surgery. By systematically reviewing existing literature, analyzing clinical data, and exploring patient-reported outcomes, the study established the factors that influence postoperative taste disturbances. Specific objectives include identifying the mechanisms of CTN injury, evaluating the impact of surgical techniques on nerve preservation, and assessing the role of patient-specific factors such as age and preoperative nerve status.

Materials and Method

This is a prospective observational study designed to correlate taste sensation and status of chorda tympani nerve in middle ear surgery.

100 Patients who were planned to undergo middle ear surgery in K.D. MEDICAL COLLEGE, MATHURA

were subjected to study. A detailed history, clinical examination and preoperative case assessment, and relevant investigation were done prior to surgery.

Status of chorda tympani nerve was noted intraoperatively, and taste sensation of patients were reassessed post operatively on 1st, 3rd and 6th week of follow up.

Inclusion Criteria

- 12 to 60 years of Age.

Exclusion criteria

- Patients undergone Previous middle ear surgery.
- Previous taste altering surgery, that is tongue and salivary gland surgeries.
- Patient with known taste disturbance. (Post viral, Patient on medication known to cause alteration in taste)
- Patient in whom chorda tympani is not intact.

Groups for Study

Based on chorda tympani nerve, patient was divided into the following groups:

GROUP I- Seen but not handled

GROUP II-Handled but not stretched

GROUP III- Stretched but intact

GROUP IV-Cut

Assessment of Taste Sensation

Patients will be subjected to detailed history and clinical examination according to predesigned proforma. All the patients underwent assessment of taste thrice: -

- A) The day before surgery
- B) 1st week after surgery
- C) 3rd week after surgery
- D) 6th week after surgery

Ability to identify taste solutions of various concentrations

Ability to identify taste solutions of various concentrations	Scores
Inability to identify the taste	0
Highest concentration	1
Intermediate concentration	2
Lowest concentration of taste solution	3

Observations and Result

Postoperative Taste Sensation Recovery Analysis

Preoperatively, all 100 patients enrolled in the study demonstrated normal taste sensation (score = 3), with none scoring 0, 1, or 2.

1st Week Post-Surgery

- Groups I and II maintained a mean score of 3, indicating no taste impairment.
- Group III showed a mild decline (mean score = 2.05), suggesting partial loss of taste.
- Group IV experienced significant impairment (mean score = 0.25).
- The difference in taste sensation scores across groups was statistically significant (p = 0.00807).

3rd Week Post-Surgery

- Group II continued with a mean score of 3.
- Group III exhibited partial recovery (mean score = 2.47).

- Group IV also showed improvement (mean score = 0.92) but remained the lowest.
- Intergroup differences remained statistically significant (p = 0.00137).

6th Week Post-Surgery:

- Groups I and II maintained normal taste sensation (mean score = 3).
- Group III nearly recovered (mean score = 2.94).
- Group IV showed further improvement (mean score = 1.5) but continued to exhibit residual impairment.
- Statistical analysis confirmed significant differences among groups (p = 0.00137).

These findings suggest that the type of surgical intervention significantly influences the degree and duration of postoperative taste disturbances.

Table 1: Taste Sensation Recovery Over Time in Different Patient Groups

Group	n	Week 1	Week 3	Week 6
I	34	All scored 3	All scored 3	All scored 3
II	21	All scored 3	All scored 3	All scored 3
III	17	2 scored 3 scored 12 scored 2	8 improved to 3, 9 remained at 2	16 scored 1 remained at 2
IV	28	21 scored 7 scored 1	4 improved to 3, 18 scored 1, 6 scored 0	5 improved to 3, 6 remained at 2, remaining at 1, 2 remaining at 0

n = Number of patients

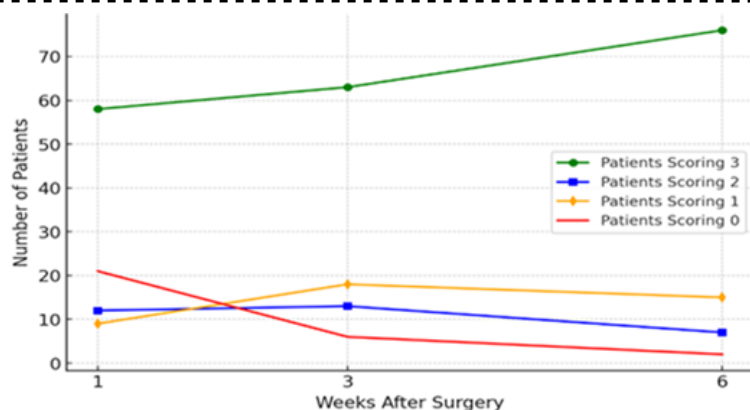


Figure 1: Taste Sensation Recovery Over Time in Different Patient Groups

Correlation of taste sensation in different groups at 6 weeks

Table 2: Table distribution of taste Sensation Recovery over Time

Groups	N	Week 1 (Mean Score ± SD)	Week 3 (Mean Score ± SD)	Week 6 (Mean Score ± SD)	P-value (Week 1 vs 3)	P-value (Week 3 vs 6)	P-value (Week 1 vs 6)
Group I	34	3.00 ± 0.00	3.00 ± 0.00	3.00 ± 0.00	N/A	N/A	N/A
Group II	21	3.00 ± 0.00	3.00 ± 0.00	3.00 ± 0.00	N/A	N/A	N/A
Group III	17	2.06 ± 0.53	2.47 ± 0.51	2.94 ± 0.24	0.015 (Significant)	0.018 (Significant)	<0.001 (Highly Significant)
Group IV	28	0.25 ± 0.44	0.92 ± 0.67	1.50 ± 0.82	0.001 (Significant)	0.05 (Moderate)	<0.001 (Highly Significant)

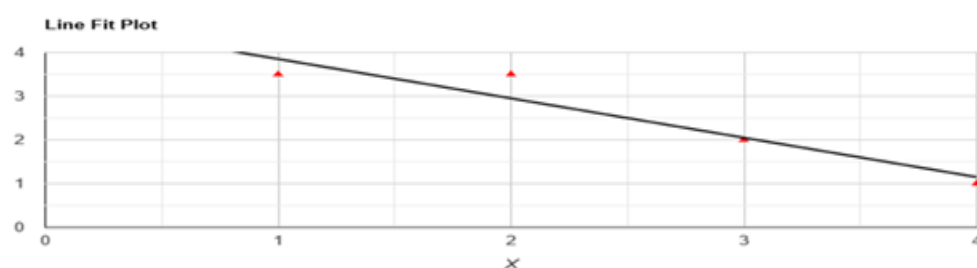


Figure 2: Statistical Analysis of Taste Sensation Recovery

We studied the correlation of intraoperative status of chorda tympani nerve and final test score of all the patient at 6wk and the Spearman rank coefficient correlation among all the groups was -0.95 which is strong negative correlation suggesting that severity of injury to chorda tympani negatively affects taste sensation postoperatively.

Discussion

This study offers critical insights into the correlation between intraoperative status of the chorda tympani nerve (CTN) and postoperative taste function. A strong inverse relationship was observed between the severity of CTN injury and postoperative taste sensation (Spearman's $\rho = -0.95$), confirming that greater nerve trauma is associated with more pronounced gustatory

impairment. These findings reinforce existing literature on the CTN's essential role in taste perception and its susceptibility during middle ear procedures.

Patients were categorised into four groups based on their postoperative taste scores. Groups I and II, which maintained normal taste perception (score = 3) across all postoperative time points, likely experienced no or minimal CTN injury. Conversely, Group III displayed transient impairment, with mean scores improving from 2.05 (week 1) to 2.94 (week 6), suggesting potential neural recovery or functional compensation. Group IV, with the most severe initial deficit (mean score = 0.25), showed only partial recovery (mean score = 1.50 by week 6), implying that more severe nerve damage may result in prolonged or incomplete restitution.

These observations align with findings by Clark et al.³, who reported persistent dysgeusia in cases of severe CTN injury. Similarly, Homoth et al.⁶ and Ott et al.⁷ described incomplete taste recovery attributable to partial reinnervation of taste buds, reinforcing the notion that recovery trajectories vary with injury severity. Gurung et al.⁸ and Guder et al.⁹ also found that taste recovery tends to be gradual and frequently incomplete, particularly in severe injuries.

Findings are consistent with those of Lafargue et al.¹, who also reported prolonged taste disturbances in older patients and those with CTN trauma. Both studies emphasised increased taste dysfunction in invasive procedures such as stapedotomy and tympanoplasty and the need for nerve-sparing techniques. The importance of preoperative counselling is also underscored.

In conclusion, transient taste disturbances are common following middle ear surgery, with most patients recovering within six weeks if CTN damage is mild to moderate. However, severe CTN injury may lead to prolonged or irreversible dysfunction. This highlights the

necessity of meticulous surgical handling of the CTN. Future studies should investigate long-term outcomes beyond six weeks and consider employing intraoperative nerve monitoring or advanced imaging to better evaluate nerve integrity and optimise postoperative sensory outcomes.¹⁰

References

1. Lafargue B, D'Andréa G, Fabre R, Alshukry A, Vandersteen C, Guevara N. Taste Disorders After Middle Ear Surgery: Chorda Tympani Nerve Injury and Quality of Life. *Otolaryngol Head Neck Surg.* 2024 Dec;171(6):1834-41.
2. Scott-Brown WG. Scott-Brown's Otorhinolaryngology, Head and Neck Surgery. 8th ed. London: CRC Press; 2018. Chapter 46, p. 535.
3. Clark M, O'Malley S. Chorda Tympani Nerve Function After Middle Ear Surgery. *Otol Neurotol.* 2007;28(3):335-40.
4. Sanna M, Russo A, De Donato G, Fois P, Pasanisi E, Mazzoni A. Middle Ear and Mastoid Microsurgery. 2nd ed. Stuttgart: Thieme; 2018.
5. Li R, Chen S, Yu D, Chen Q, Xia Y, Huang Y. The Impact of Different Manipulations of the Chorda Tympani Nerve on Taste in Endoscopic Ear Surgery. *Flavour Fragr J.* 2024.
6. Just T, Homoth J, Graumueller S, Pau H. Taste disorders and recovery of the taste function after middle ear surgery. *Laryngorhinootologie.* 2003;82(7):494-500.
7. Ott I, Tebben H, Losenhausen H, Issing P. Anatomical course of the chorda tympani nerve in middle ear surgery: clinical classification and relevance for postoperative gustatory dysfunction. *Laryngorhinootologie.* 2009;88(9):592-8.

8. Gurung U, Bhattarai H, Shrivastav R. Taste disturbances following middle ear surgery. *Journal of Institute of Medicine* 2011 Jun. 24 ;32(3):18-23.
9. Guder E, Böttcher A, Pau H, Just T. Taste function after stapes surgery. *Auris Nasus Larynx*. 2012;39(6):562-6.
10. Ravindran V, Shetty D, Somayaji K. Effect of middle ear surgery on taste in patients with chronic otitis media. *Indian J Otol*. 2020; 26:155-8.