

Evaluation of Taste Disturbance in Pre and Post Mastoid Surgery Patients

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Abstract

Background: Mastoid surgery is one of the commonest surgeries in Otolaryngology & Head & Neck department. Surgeons are less aware of preserving chorda tympani nerve (CT). Injury to the chorda tympani nerve is common in middle ear surgery as the course of CT runs between ossicles and close to tympanic membrane. It makes the surgeon difficult to preserve it during the surgery. The study was done to observe frequency of taste disturbances (TD) in all patients undergoing mastoid surgery and to correlate between intraoperative status of CT and type of intraoperative status of CT injury with postoperative taste disturbances.

Methods: A prospective analytical study was conducted in patients who underwent mastoid surgery. The intraoperative status of CT was studied, different forms of injury to the nerve were noticed and its impact on taste disturbances was assessed subjectively with questionnaire. The patients with taste disturbances were followed till twelve weeks.

Result: None of the patients had taste disturbances prior to surgery. Out of 65 patients, only 15 patients became symptomatic in second postoperative day and the taste disturbances were in the form of altered taste (26.66%), dry mouth (26.66%) and numbness (46.66%). Symptoms like altered taste and numbness were present till the eighth week of surgery and disappeared by the twelfth week except one patient in whom numbness persisted till twelfth week. The symptoms did not correlate with the intraoperative status of CT. The symptoms disappeared with duration of operation and it was significant.

Conclusion: None of the patients voluntarily complained regarding taste disturbances until they were specifically asked. Only 15 patients had taste disturbances; 7 had numbness, 4 dryness of mouth and 4 altered taste. The taste disturbances did not correlate with the type of intraoperative status of CT. CT was not identified in 9 patients and only 3 (33.3%) became symptomatic and CT was cut with micro-scissors in 26 patients but only 4 (15.38%) patients were symptomatic.

Key words: Chorda tympani nerve, mastoid surgery, taste disturbances

Introduction

Mastoid surgery is a common surgery in otorhinolaryngology. During the mastoid surgery, superior and posterior wall of the bony meatus is removed and the bone overlying the vertical part of the facial nerve is lowered. This gives proper access and visualization for a

surgeon for removal of the disease. The purpose of mastoid surgery is to make the ear dry and safe.

Chorda tympani nerve is a branch of facial nerve within the middle ear. It is a mixed nerve that has a sensory fibers which supply the fungiform papillae and anterior two third of the tongue and the secretomotor fibers which contain preganglionic parasympathetic axons to submandibular and sublingual glands. In the

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middle ear, it lacks bony covering as it passes close to the annulus of the tympanic membrane between the incus and the malleus. Injury to the CT is common in mastoid surgery. During mastoid surgery, the fibrous band in the tympanomastoid suture line can often be confused with CT although the angle of white strands of the suture line is different from the angle of the CT. CT can even be confused with the annulus.^{1,2} Generally, the nerve comes into the operative field while elevating the tympanomeatal flaps and working near the ossicles. It makes the surgeon difficult to preserve it during the surgery.³ The CT is exposed to different kinds of surgical stresses, like: stretch, injury by rotating burr, dryness or clean cut with micro-scissors for better approach to ossicles. Different manipulation of CT may lead to post operative taste disturbances.^{3,4,5}

Methods

This was a prospective analytical study done in sixty-five patients in department of Otolaryngology and Head & Neck surgery, B. P. Koirala Institute of Health Sciences, Dharan from August 2015 to July 2016. Ethical clearance/ approval was obtained from institutional review board and research committee as per protocol. Informed consent was obtained from all patients undergoing mastoid surgery complying with inclusion criteria.

How long have you noticed the changes?³

All the patients with age more than 12 years who were undergoing mastoid surgery for the first time were included in the study. The patients with mental retardation, psychiatric illness, neurological illness, diabetes mellitus, patients taking drugs which causes taste disturbances, patients who had history of surgery on salivary gland and tongue were excluded.

Complete history and clinical examination were done in patients who fell in inclusion criteria. Surgery was planned according to history and clinical examination and investigations, like: x-ray mastoid Towne's view and lateral oblique and audiological test. All the patients who were included in the study were asked about taste sensation prior to mastoid surgery. Questions were asked regarding taste sensation before and after mastoid surgery and disturbances in taste were assessed. The questions asked for subjective assessment of the taste disturbances were based on the questionnaire developed by Nin et al^{6,7} with some modification.

Questionnaire:

Section 1

Did you have any disturbance of taste after the operation? Yes or No

- If the answer is 'no', please finish the questionnaire now. Thank you for your help.
- If the answer is 'yes', please go to section 2.

Tongue symptom	2 nd day of operation	2 nd week of operation	4 th week of operation	8 th week of operation	12 th week of operation
Altered taste					
Dryness					
Numbness					
Other taste disturbances					

Section 2

The symptoms of taste disturbances in patients were classified according to the intra-operative status of CT.

- Patients in which CT was identified and preserved: (CT_P)
- Patients in which CT was identified and clean cut with micro scissors: (CT_C)
- Patients in which CT was not identified: (CT_NI)
- Patients in which CT was traumatized by burr while drilling mastoid bone (iatrogenic trauma): (CT_IATRO)
- Patients in which CT was stretched during handling: (CT_S)

Result

Age distribution

There were 65 patients in this study, age ranging from 12 to 45 years.

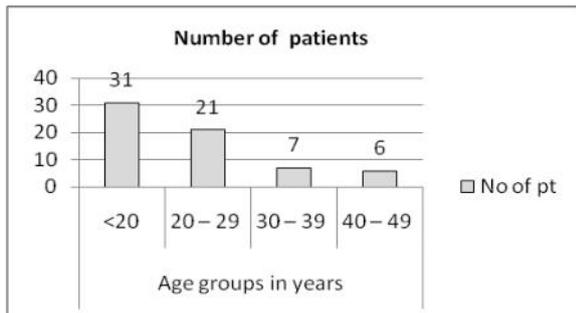


Figure 1: Age distribution

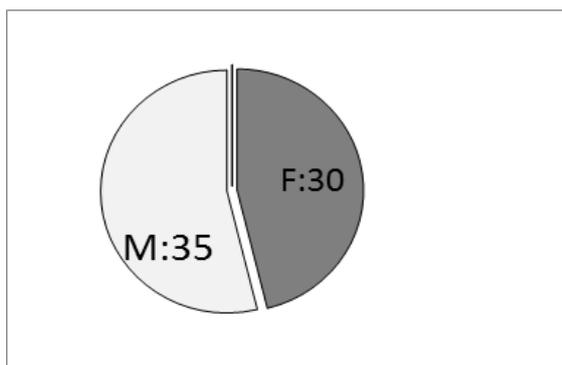


Figure 2: Sex distribution

Sex distribution

Overall, there was slight male predominance.

Table 1: Taste disturbances with duration of surgery

Post operative period	Type of taste disturbance	No. of pt.	%
2 nd day of operation	No	50	76.9
	Yes	15	23.1
If yes	Altered taste	4	26.7
	Dry Mouth	4	26.7
	Numbness	7	46.7
2 nd week of operation	No	56	86.2
	Yes	9	13.8
If yes	Altered test	3	33.3
	Numbness	6	66.7
4 th week of operation	No	60	92.3
	Yes	5	7.7
If yes	Altered test	2	40.0
	Numbness	3	60.0
8 th week of operation	No	64	98.5
	Yes	1	1.5
If yes	Numbness	1	100.0
12 th week of operation	No	64	98.5
	Yes	1	1.5
If yes	Numbness	1	100.0
Total		65	100.0

While assessing taste disturbances, none of the patients voluntarily revealed taste disturbances unless they were asked. Out of 65 patients, 15 patients had taste disturbances in the form of altered taste, dry mouth and numbness. On second day of operation, only 15 patients (23.1%) were symptomatic and the symptoms gradually decreased as the duration of post operative period increases. Symptomatic patient decreased to 1 patient (1.5%) by 12th week of operation. Numbness was persistent in one patient even after 3 months whereas altered taste and dryness of mouth improved in subsequent follow ups.

The study shows that out of 65 patients, CT was preserved in 22 (33.8%), clean cut in 26 (40%), not identified in 9 (13.8%), iatrogenic trauma in 4 (6.2%) and stretched in 4 (6.2%).

Table 2A and 2B: Association between taste disturbances with post operative period in which CT was preserved, cut, not identified, iatrogenic trauma and stretched.

Post-operative period (POD)	Taste disturbance (TD)	CT_P		P Value (PV)	CT_C		P V	CT_NI		P V
		No (N)	Yes (Y)		N	Y		N	Y	
2 nd day of operation	N	32 (64.0)	18 (36.0)	0.503	28 (56.0)	22 (44.0)	0.229	44 (88.0)	6 (12.0)	0.431
	Y	11 (73.3)	4 (26.7)		11 (73.3)	4 (26.7)		12 (80.0)	3 (20.0)	
2 nd week of operation	N	36 (64.3)	20 (35.7)	0.427	32 (57.1)	24 (42.9)	0.241	48 (85.7)	8 (14.3)	0.798
	Y	7 (77.8)	2 (22.2)		7 (77.8)	2 (22.2)		8 (88.9)	1 (11.1)	
4 th week of operation	N	39 (65.0)	21 (35.0)	0.496	35 (58.3)	25 (41.7)	0.342	51 (85.0)	9 (15.0)	0.351
	Y	4 (80.0)	1 (20.0)		4 (80.0)	1 (20.0)		5 (100.0)	0 (0.0)	
8 th week of operation	N	42 (65.6)	22 (34.4)	0.471	38 (59.4)	26 (40.6)	0.677	55 (85.9)	9 (15.0)	0.862
	Y	1 (100)	0 (0.0)		1 (100)	0 (0.0)		1 (100.0)	0 (0.0)	
12 th week of operation	N	42 (65.6)	22 (34.4)	0.471	38 (59.4)	26 (40.6)	0.677	55 (85.9)	9 (15.0)	0.862
	Y	1 (100)	0 (0.0)		1 (100)	0 (0.0)		1 (100.0)	0 (0.0)	

Table 2A shows that there is no significant association between taste disturbances with intraoperative status of CT with duration of post operative period in conditions whether the nerve was preserved, clean cut, not identified.

Table: 2B

POD	TD	CT_IATRO		P Value	CT_S		P Value
		N	Y		N	Y	
2 nd day of operation	N	46 (92.0)	4 (8.0)	0.566	50 (0.0)	0 (0.0)	0.00
	Y	15 (100.0)	0 (0.0)		11 (73.3)	4 (6.2)	
2 nd week of operation	N	52 (92.9)	4 (7.14)	0.408	50 (0.0)	0 (0.0)	0.00
	Y	9 (100.0)	0 (0.0)		11 (73.3)	4 (6.2)	
4 th week of operation	N	56 (93.3)	4 (6.66)	0.355	59 (98.3)	1 (1.7)	0.00
	Y	5 (100.0)	0 (0.0)		2 (40.0)	3 (60.0)	
8 th week of operation	N	60 (93.8)	4 (6.25)	0.796	61 (95.3)	3 (4.70)	0.00
	Y	1 (100.0)	0 (0.0)		0 (0.0)	1 (100.0)	
12 th week of operation	N	60 (93.8)	4 (6.25)	0.796	61 (95.3)	3 (4.70)	0.00
	Y	1 (100.0)	0 (0.0)		0 (0.0)	1 (100.0)	

Table 2B shows that there is no significant association between taste disturbances with intraoperative status of CT with duration of post operative period. There was iatrogenic trauma in 4 patients but none of them had taste disturbance. However, there were significant taste disturbances in patients who had stretched CT.

Table 3A and 3B: Correlation of taste disturbances in 2nd day of operation, 2nd week and 4th week in comparison with 2nd week, 4th week, 8th week and 12th week of operation

TABLE: 3A

POD	TD	2 nd day of operation		P Value	2 nd week of operation		P Value	4 th week of operation		P Value
		N	Y		N	Y		N	Y	
2 nd week of operation	N	50 (89.3)	6 (10.7)	0.031						
	Y	0 (0.0)	9 (100.0)							
4 th week of operation	N	50 (83.3%)	10 (16.0)	0.002	56 (93.3)	4 (6.7)	0.125			
	Y	0 (0.0)	5 (100.0)		0 (0.0)	5 (100)				
8 th week of operation	N	50 (78.1)	14 (21.9)	0.000	56 (87.5)	8 (12.5)	0.008	60 (93.8)	4 (6.3)	0.125
	Y	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)		0 (0.0)	1 (100)	
12 th week of operation	N	50 (78.1%)	14 (21.9)	0.000	56 (87.5)	8 (12.5)	0.008	60 (93.8)	4 (6.3)	0.125
	Y	0 (0.0)	1 (100.0)		0 (0.0)	1 (100.0)		0 (0.0)	1 (100.0)	

Table: 3B

Post operative period	Categories	8 th week of operation		P Values	Remarks
		No	Yes		
12 th week of operation	No	60 (93.8)	4 (6.3)	0.125	Not significant
	Yes	0 (0.0)	1 (100.0)		

The above table 3A shows significant correlation of taste disturbances (TD) in 2nd day of operation in comparison to 2nd week, 4th week, 8th week and 12th week. Regarding correlation of TD in 2nd week with 4th week, 8th week and 12th week of operation, the table shows significant correlation with 8th week and 12th week of operation. There was no significant correlation while analyzing 4th week with 8th week and 12th week of operation.

The table 3B shows no significant correlation while analyzing 12th week with 8th week of operation.

Discussion

In the present study, none of the patients voluntarily complained regarding the taste disturbances preoperative and postoperatively. Out of 65 patients, only 15 patients admitted taste disturbances (TD) only when they were asked questions regarding the changes in taste. In contrast to our study, work done by Gopalan et al³ and Mahendra et al⁷ reported that patients complained of taste disturbances following middle ear surgery without asking them.

In our study, CT was identified and preserved without any level of known injury in 22 patients (33.8%) in which 4 developed taste disturbances. Out of 26 patients (40%) who underwent clean cut of CT with micro scissors, only 4 developed taste disturbances. All 4 (6.2%) patients in whom CT was stretched while working in middle ear became symptomatic which was significant.

It is interesting to note that CT was accidentally exposed to trauma by rotating burr but none of them were symptomatic. In relation to this study, Clark et al⁸ stated that chronicity of the middle ear disease leads to gradual hypofunction and patient is not aware of further post-operative taste disturbances following surgery. Landis et al⁹ also found that changes in

the taste sensation of the anterior two third of the tongue, on the ipsilateral side of chronic inflammatory middle ear disease process unnoticed by the patient.

Similar study was done by Clark et al⁸ in which 21 had undergone mastoid surgery, CT was sectioned in 16 patients (76.19%) but only 5 patients (31%) became symptomatic. Clark had observed stretching of CT in 5 patients (33.33%) but none of them developed taste disturbances. In the present study, numbness was seen in 7 (46.7%) which was the most common and this finding is similar to that of Maharjan et al¹⁰ with 76.96% and Nin et al⁶ with 56%. Contrary to our study, Clark and Micheal et al¹¹ found metallic taste to be the commonest symptom. Mahendran et al^{7,12} had studied taste disturbances in patients who had undergone stapedectomy. He had found metallic taste (34%) to be the commonest, followed by: numbness (24%), tingling (13%) and sweet taste (11%).

In our study, CT was not identified in 9 patients but only 3 became symptomatic. Saito et al¹³ suggested that CT could have been injured unknowingly by the surgeon in spite of its existence in the middle ear. This might be due to

extensive granulation tissue in the middle ear obscuring surgical field.

According to study done by Saito and colleagues, the incidence of postoperative subjective taste disorder in non touched, touched and severed group were 2.8%, 25.5% and 38.9% respectively. Subjective taste disturbances recovered after surgery in all groups within 1 year to 2 years. He also found that there was long term recovery of clinical (subjective) taste perception than of objective taste function measured by electrogustometry.

We observed that as the duration of post operative period increases, the symptoms had gradually decreased in frequency which was similar to study done by Maharjan et al.¹⁰

In our study, we assessed subjectively with questionnaires but Berling Hom K and his colleagues did taste assessment using electrogustometry (EGM) and filter paper disc prior to surgery and after surgery up to one year. They noticed that the difference in EGM one week after surgery compared with preoperative EGM was significantly greater among CSOM patient than otosclerosis. There was no significant finding after one year of surgery.¹⁴

Berlin Holm K et al. in his other study found that 5.2% patients reported the persistence of taste disturbances at 1 year of stapes surgery. The taste disturbance at 1 year post operative period correlated with decrease of physical function domain in the SF-36.¹⁵

Conclusion

None of the patients had absence of taste after mastoid surgery. None of the patients voluntarily complained regarding taste disturbances and they complained only when

they were questioned about the taste disturbances. Among 65 patients in the study, only 15 patients had taste disturbances. In those 15 patients, 7 had numbness, 4 dryness of mouth and 4 altered taste. There was no significant association of the intraoperative status of chorda tympani nerve and taste disturbances with the duration of postoperative period. There was significant correlation of taste disturbances in second day of operation in comparisons with 4th week, 8th week and 12th week and also with 4th week with 8th and 12th week of operation. There was disappearance of taste disturbances in 14 out of 15 with increased duration of post operative period. Only one had persistent taste disturbance even after 12 week of postoperative period.

Illustration

The black arrow is showing the intraoperative identification of Chorda Tympani nerve while doing mastoid.



Limitation

In this study, only one patient had persistence of taste disturbances till three months, so, it would have been better if the follow up period is at least one year to know whether the taste disturbances disappear with subsequent follow up.

Recommendation

Further studies of greater number of cases and efforts with longer follow up period are recommended to consider the fate of taste disturbances post mastoid surgery. It is recommended to preserve chorda tympani nerve wherever it is possible and the risk of taste disturbances must be included in preoperative consent which is most of the time ignored by ENT surgeons. This could be more important in professionals like chefs and wine tasters.

Conflict of interest and funding

No conflict of interest and no sources of funding.

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