

Chorda Tympani Trauma - How Much Does It Affect Taste?

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ABSTRACT

The chorda tympani nerve runs just beneath the tympanic membrane, and is often traumatised or sacrificed during middle ear surgery. There is varied opinion as to whether surgeons should preserve this nerve, risking trauma to it in the process, or cleanly sacrifice it, which some authors claim produces less trauma and less troubling dysgeusia. We studied 31 patients retrospectively to document their taste change following middle ear surgery, and found that in many instances, taste change caused by the operation recovered in the course of time. However, when the chorda was sacrificed, there was a 31% increased incidence of permanent taste change.

Keywords: chorda tympani, trauma, taste, ageusia, dysgeusia

INTRODUCTION

The chorda tympani carries afferent fibres of taste from the anterior two-thirds of the tongue, and efferent parasympathetic secretomotor fibres from the inferior salivary nucleus to the submandibular and sublingual salivary glands.

In middle ear surgery, the chorda tympani is frequently encountered just beneath the tympanic membrane. It is somewhat variable in its position in the posterior-superior portion of the external auditory meatus, being at times completely ensheathed in a protective canal of hard bone, and at other times coursing freely on the undersurface of the tympanic membrane.

It lies directly in the way of the surgeon in many instances, and tends to be subjected to a wide range of trauma, whether it be unwittingly stretched while raising a tympano-meatal flap during myringoplasty, or voluntarily sacrificed during stapedectomy to improve the view of a fixed stapes.

This study aims to document the taste changes which patients experience as a result of trauma to the chorda tympani.

METHOD

We studied the taste changes in 31 patients who had surgery for ossicular problems. The various middle ear pathologies for which these patients required surgery were: otosclerosis (27), congenital or acquired conductive hearing loss (4).

We excluded from our study, patients with chronic ear infections, such as chronic suppurative otitis media or cholesteatoma, to eliminate the possibility that chorda function was already compromised prior to surgery by the ongoing ear infection⁽¹⁾.

All 31 patients underwent some form of tympanotomy, with the chorda either sectioned or left intact. The surgeries were carried out between November 1992 and October 1995.

The assessment of patients was retrospective, with our focus on the patients' own appreciation of taste change or loss of taste, duration of symptoms and timing of recovery, if any.

The follow-up period ranged from 5 months to 40 months, and averaged 22.3 months.

The patients were divided into 2 groups for comparison - chorda preserved, and chorda sacrificed. The symptom of post-operative taste change was described in 2 ways, viz ageusia, or dysgeusia. Dorland's Medical Dictionary defines ageusia as "lack or impairment of the sense of taste" and dysgeusia as "perversion of the sense of taste".

Objective quantitative tests such as electrogustometric tests, and qualitative measurements such as testing with salt, sugar, acid and alkali were not done in this study, as they have been shown by Bull⁽²⁾ and Grant⁽³⁾ to correlate poorly with patients' symptomatology. These tests are more useful for defining the anatomical deficit following sectioning of the chorda tympani.

Fisher's exact test was used in assessing significance in the statistical analysis.

RESULTS

There were a total of 31 patients studied, of which 14 had the chorda tympani sacrificed, and 17 had the continuity of chorda tympani preserved.

Ten patients in the immediate post-operative period had no taste change.

Thirteen patients reported "tastelessness" or ageusia.

Seven patients noticed a perversion of certain taste modalities, or dysgeusia. Three complained of increased sweetness, and one of increased saltiness. One patient complained of decreased saltiness, and another of decreased sweetness and sourness. One patient could only say that his food did not taste as good as before.

These patients were also followed to see if their taste deficit recovered over time.

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Table I shows how taste recovers following surgery.

Table I - Post-operative taste and recovery

| Taste | Chorda preserved | % | Chorda sacrificed | % |
|------------------------|------------------|------|-------------------|------|
| no change | 7 | 41% | 3 | 21% |
| changed, with recovery | 8 | 47% | 5 | 36% |
| permanent deficit | 2 | 12% | 6 | 43% |
| Total | 17 | 100% | 14 | 100% |

Table II shows the type of taste change (if any) which occurs.

Table II - Type of taste change and type of surgery

| Taste | Chorda sacrificed | % | Chorda preserved | % |
|-----------|-------------------|------|------------------|------|
| ageusia | 7 | 64% | 6 | 60% |
| dysgeusia | 4 | 36% | 3 | 30% |
| undefined | - | - | 1 | 10% |
| Total | 11 | 100% | 10 | 100% |

DISCUSSION

Chorda sacrificed

Immediate post-op results

Loss of taste (ageusia)

Sectioning of a nerve supplying taste fibres to half the tongue should theoretically result in a total loss of taste to half the tongue. Conversely, preservation of continuity of the nerve should preserve taste. However, it is the impression of most clinicians that this is not invariably the case.

In this study, sacrificing the chorda tympani did not produce a change in taste in 3 of 14 (21%) patients.

This could be due to remaining innervation of the tongue from the opposite chorda tympani, as well as glossopharyngeal taste supply to the posterior 1/3 of the tongue. Diamond and Frew showed that as much as 66% of sensation can be retained after sectioning one chorda tympani⁽⁴⁾.

Altered taste (dysgeusia)

It is quoted in some textbooks⁽⁵⁾ that stretching, but not cutting, of the chorda tympani results in dysgeusia, which can be more distressing than simple ageusia. Therefore it is suggested that it may be better to cut the chorda cleanly, rather than to try and preserve it, traumatising it in the process.

In our study, irrespective of whether the chorda was sacrificed or preserved, there appeared to be no difference in the incidence of ageusia and dysgeusia (Table II). Neither did the patients with dysgeusia appear to be more distressed by their symptoms, than the patients with ageusia.

Decreased salivation

Grant and Miller found that unilateral chorda tympani trauma (such as that occurring in this study) appeared to have only a subclinical effect on salivary flow of the submandibular gland, and none on the parotid gland⁽³⁾. Bilateral chorda tympani section is a better method of reducing salivary flow, but even then there is some recovery of salivary flow⁽⁶⁾.

Based on this, we did not attempt to study the effects of chorda tympani trauma on salivary flow.

Late post-op results

Over a period of time, 36% of patients with sacrificed chordas recovered from their taste deficit, and the percentage of patients with taste change dropped from 79% to 36%.

This is in keeping with the findings of Bull⁽²⁾, who found that only 32% of 126 cases had persistent symptoms.

Kinnman and Aldskogius suggest that taste buds and fungiform papillae deprived of chorda tympani innervation can be restored by innervation with alternative nerve fibres⁽⁷⁾.

However, Chilla and Nicklatsch considered that recovery could simply be due to patients no longer noticing their taste deficit⁽⁸⁾.

Chorda preserved

Immediate post-op results

By comparison, if a patient has had continuity of the chorda tympani preserved, the incidence of taste preservation is improved (p value = 0.218). In the immediate post-operative period, 7 out of 17 (41%) of patients experienced no taste change.

However, 59% of patients still experienced a change in taste although the chorda was anatomically preserved. This may be due to the fact that a nerve, although grossly "preserved", is still subject to such trauma as stretching, reduction of blood supply, heat stress from nearby bone drilling, and other minor trauma. This "invisible" trauma is probably sufficient to produce a neuropraxia of the chorda or even an axonotmesis in some patients who do not recover.

Our immediate post-operative results for taste preservation were not as good as Chilla's⁽⁹⁾, who found that taste was preserved in five out of six (84%) patients, with dysgeusia in only one patient (16%), when the chorda was not divided.

Late post-op results

With the chorda preserved, and the passage of time, the incidence of taste change dropped from 59% to 12% (47% recovery).

Similarly, in Bull's study⁽²⁾ of 100 patients with "stretched" but intact chordas, the incidence of symptoms was initially 51%, but dropped to 7% after recovery.

An unexpected but significant finding in our study was that the symptom of dysgeusia in the immediate

Table III - Type of taste change and recovery

| Taste | ageusia | % | dysgeusia | % |
|-------------------|---------|------|-----------|------|
| recovered | 11 | 85% | 1 | 14% |
| permanent deficit | 2 | 15% | 6 | 86% |
| Total | 13 | 100% | 7 | 100% |

post-operative period had a very strong correlation with poor taste recovery, and a high chance of permanent deficit (Table III). Six out of 7 patients (86%) with dysgeusia had a permanent taste deficit. By contrast, if a patient had ageusia, the probability of a permanent taste deficit was much lower (2 out of 13 patients ie 15%).

These results were significant, using Fisher's test, with $p = 0.0044$.

This may be related to the finding that dysgeusia (eg. phantom taste) can be of central origin, due to the degeneration of central axons in a transganglionic process⁽¹⁰⁾.

CONCLUSION

Sacrifice of the chorda tympani during ear surgery does not necessarily result in taste change.

Even when taste change occurs, there is substantial recovery of taste with time. If the chorda is sacrificed, recovery occurs in 36% of patients, and when the chorda is preserved, recovery occurs in 47% of patients.

With regards to permanent taste deficit, this was higher (43%) in the group with the chorda sacrificed, and only 12% in the group with the chorda preserved. In short, the risk of permanent taste deficit is 31% higher if the chorda tympani is sacrificed (p value = 0.0595).

Patients who experience dysgeusia post-operatively, rather than ageusia, are at a significantly higher risk (71 %) of permanent taste change.

This study suggests that, whenever possible, the chorda should be preserved, even if minor trauma to the chorda should occur.

ACKNOWLEDGEMENT

The authors wish to thank Professor A Gibb for lending his invaluable experience in otology to this study, and for his most constructive and encouraging comments during the writing of the manuscript.

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