Younger Patients Have a Higher Rate of Recovery of Taste Function After Middle Ear Surgery

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Background: Although the chorda tympani nerve (CTN) is frequently damaged during tympanoplasty, little attention has been given to the patients' symptoms and taste function.

Objective: To investigate patients' symptoms and the functional recovery of taste after surgery using electrogustometry (EGM).

Design: Prospective study.

Patients: Analysis of 163 ears of 156 patients who underwent middle ear surgery from April 1997 through December 1999. There were 18 ears with noninflammatory diseases, 80 with chronic otitis media, and 65 with cholesteatoma. The patients' taste functions were examined 2 days before surgery and 2 weeks and 6 months after surgery.

Main Outcome Measures: The taste disturbance before and after middle ear surgery and the relationship between age and the recovery rate of CTN function.

Results: Two weeks after surgery, the mean EGM threshold was elevated in all groups regardless of preservation or section of the CTN. Numbness in the tongue and taste disturbance were more frequently found in patients with preservation of CTN than in those with section of the CTN ($P=0.008$ and $P=0.001$, respectively). In patients with preservation of the CTN, 6 months after surgery, the recovery rate of EGM threshold was 83% in those aged 20 years or younger ($P=0.008$ compared with the 2 older groups), 53% in the those aged 21 to 40 years, and 44% in those aged 41 to 60 years.

Conclusion: Age is an important factor for recovery of taste function after middle ear surgery, which is useful information when explaining complications to patients.
PATIENTS AND METHODS

One hundred sixty-three ears of 156 patients with middle ear diseases were examined 2 days before surgery and 2 weeks and 6 months after surgery from April 1997 through December 1999. Subjects with previous ear operations were not included. Subjects consisted of 77 males and 79 females with ages ranging from 5 to 60 years (mean, 40.4 years). Patients older than 60 years were excluded because taste function naturally deteriorates with aging.\(^n\text{1,2}\) Electrogustometry was performed according to the method of Tomita et al.\(^7\) The stimulation range of EGM threshold was –8 to 34 dB (normal range, <8 dB). Cases that were not measured by electrogustometry were statistically analyzed as 36 dB. The point measured with EGM was the ridge 2 cm behind the tip of the tongue. Electrogustometry was measured by only one physician (M.S.) who was skillful in the procedure.

After the patient’s consent and permission were obtained, symptoms such as tongue numbness and taste disturbance were investigated by only one physician (M.S.) during the first 2 postoperative weeks. The middle ear diseases were classified into non-inflammatory diseases such as posttraumatic perforation and otosclerosis (18 ears), chronic otitis media (80 ears), and cholesteatoma (65 ears). Patients with no response to EGM bilaterally and those with bilateral section of the CTN were excluded.

The statistical analysis of postoperative symptoms was performed using the \(X^2\) test, and the relationship between the recovery rate and age was evaluated using the Jonckheere-Terpstra trend test.

patients complained of taste disturbance except for one patient who had facial palsy.

Two weeks after surgery, the EGM threshold was elevated regardless of preservation or section of the CTN in all groups: 24.7 ± 13.5 dB and 29.0 ± 9.2 dB in the non-inflammatory group, 16.8 ± 14.4 dB and 35.0 ± 2.0 dB in the chronic otitis media group, 22.8 ± 14.3 dB, and 30.3 ± 11.0 dB in the cholesteatoma group for those with preservation and section of the CTN, respectively (Figure 1). We asked about the presence of symptoms in 104 cases; the other 52 patients did not report clear symptoms. Taste disturbance occurred in 37 (55%) of 67 cases with preservation and in 8 (22%) of 37 cases with section. Numbness in the tongue occurred in 28 (42%) and 8 (22%) of 37 cases with preservation and section of the CTN, respectively (Table 1). The patients with preservation of the CTN had a significantly higher rate of symptoms than the patients with section (\(P = .001\) for taste disturbance; \(P = .008\) for numbness; \(X^2\) test).

Among the preservation patients, we selected those with a normal EGM threshold before surgery and compared the EGM thresholds at 2 weeks and 6 months after surgery. Those aged 0 to 20 years had a higher rate of cholesteatoma and a lower rate of noninflammatory disease than the other groups (Table 2). The recovery rate of EGM threshold was higher at 6 months than at 2 weeks in all 3 groups. Six months after surgery, the rate of complete recovery was 83% in those aged 0 to 20 years, 53% in those aged 21 to 40 years, and 44% in those aged 41 to 60 years (Figure 2). The youngest group had a significantly higher recovery rate of EGM threshold than the older groups (\(P = .008\) for all, Jonckheere-Terpstra trend test).

Based on the results of orthopedic studies, it is well known that peripheral motor and sensory nerves recover better and faster in children than in adults, especially the digital, median, ulnar, and radial nerves.\(^1,1\) In the cranial nerves, the rate of recovery from idiopathic facial palsy decreased from 83% for subjects in their 20s to 54% for subjects in their 80s.\(^2\) This study was concerned with the recovery of movement in the extremities and the functional recovery of the sense of touch. However, little attention has been paid to the correlation between age and...
the recovery of special senses such as taste and olfaction, because most physicians do not know when these nerves are injured or how to measure the recovery rate. Fortunately, at our institution, our otologists have many chances to handle the CTN during tympanoplasty and to know how to measure CTN function.

Patients older than 60 years were omitted because taste function deteriorates with age and the threshold is elevated in elderly persons. In fact, 35 chronic otitis media patients between 61 and 70 years old were operated on during the same period as this trial, and they had a mean ± SD EGM threshold of 12.5 ± 11.8 dB on the healthy side and 18.5 ± 13.5 dB on the diseased side. The rate of abnormal EGM values (≥ 10 dB) was 60% (21/35) on the healthy side. Thus, it is difficult to evaluate the damage and recovery of CTN function in elderly patients.

The EGM findings before surgery showed that chronic inflammation elevated the taste threshold to a little higher than the normal level, which meant impaired CTN function, as shown in a previous study. However, no patients except for one with facial palsy complained of taste disturbance. It is possible that damage to CTN function occurred gradually as a result of chronic inflammation. In addition, most patients had unilateral lesions, and in the 7 patients with bilateral lesions, the second ear was operated on after the functional recovery of CTN in the first ear.

Although the EGM threshold 2 weeks after surgery was elevated in all groups regardless of the preservation or section of the CTN, the incidence of numbness or taste disturbance was significantly higher in the patients with preservation than in those with section. It is possible that injury of the CTN by traction or stretching produced abnormal stimulation that was transduced to the peripheral organ, but this has not been established. Furthermore, since most of the symptoms ceased by 6 months after surgery, numbness in the tongue and taste disturbance were not serious problems.

Younger patients had a significantly higher recovery rate of CTN function consistent with the rate of recovery of function of peripheral nerves and the facial nerve.

The types of diseases were different among the 3 groups; ie, those in the youngest group had a higher percentage of cholesteatoma and a lower percentage of noninflammatory disease than those in the 2 older groups. Patients in all 3 groups had normal EGM thresholds before surgery, and, in general, more effort is required to preserve CTN function in patients with cholesteatoma than in patients with noninflammatory disease and chronic otitis media. Therefore, we believe that the present finding of recovery of CTN function is a result of the high regenerative nerve ability in young patients.

Because previous studies disregarded the patients’ age, it has been controversial whether or not CTN function recovers after preservation of the CTN. The present study helps resolve this issue and helps explain the potential complications of surgery.

Preservation of the CTN was more important in the bilateral cases, because loss of CTN function on both sides meant loss of taste in the anterior two thirds of the tongue and impaired the patients’ quality of life. In the present study, preservation of the CTN led to a functional recovery in more than 80% of the young patients and more than 50% of the middle-aged and older patients; thus, in bilateral cases, we recommend that surgeons attempt to preserve the CTN in the operation on the first ear.

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