

Long-term deterioration of bone-conduction hearing level in patients with labyrinthine fistula

Hirokazu Katsura^{a,*}, Yasuo Mishiro^a, Osamu Adachi^a, Koichi Ogino^a, Tadashi Daimon^b, Masafumi Sakagami^a

^a Department of Otolaryngology, Hyogo College of Medicine, Nishinomiya-City, Hyogo, Japan

^b Department of Biostatistics, Hyogo College of Medicine, Nishinomiya-City, Hyogo, Japan

ARTICLE INFO

Article history:

Received 15 November 2012

Accepted 25 March 2013

Available online 25 May 2013

Keywords:

Labyrinthine fistula

Bone-conduction hearing level

Cholesteatoma

ABSTRACT

Objective: Although many reports describe the short-term hearing outcomes of surgically managed labyrinthine fistulae, the long-term results remain unknown. We reviewed the long-term postoperative hearing outcomes of 14 ears of patients with cholesteatoma and labyrinthine fistulae.

Methods: Between 1996 and 2010, 84 patients with cholesteatoma and labyrinthine fistula underwent tympanoplasty at Hyogo College of Medicine Hospital. Fistulae were located in the lateral semicircular canal in all patients and in the superior semicircular canal in one. Fourteen patients were followed up for more than 5 years.

Results: The postoperative air-bone gap was ≤ 10 dB in one patient, between 11 and 20 dB in seven, between 21 and 30 dB in four, and ≥ 31 dB in two. Mean bone-conduction hearing levels on the operated side had deteriorated by 3, -1 and -2 dB at 1, 2 and 4 kHz, respectively at 1 year postoperatively, and by 8, 6 and 2 dB at 1, 2 and 4 kHz, at 5 years postoperatively. Bone-conduction hearing levels at 1 and 2 kHz were significantly deteriorated at 5 years postoperatively, compared with baseline and 1 year ($P < 0.05$).

© 2013 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

The rate of labyrinthine fistula occurring as a common complication of extensive cholesteatoma is 4–15% [1–3] and they open into the lateral semicircular canal in 90% of such patients [4–6]. Inner ear function can be preserved when fistula are not extensive and appropriately treated [6,7] and electrophysiological studies of experimental animals have shown that hearing can also be preserved after semicircular canal transection [8,9]. In fact, patients rarely develop deafness that is directly associated with surgical procedures. Some studies have even described improved hearing after surgical management [9–12], but these studies were not long-term. We previously reported that inflammation caused by chronic otitis media induces the deterioration of bone conduction hearing over the long term [13].

The present study reviews long-term hearing outcomes in patients who underwent surgery to treat cholesteatoma and labyrinthine fistula.

2. Materials and methods

Between 1996 and 2010, 84 patients with cholesteatoma and labyrinthine fistula underwent tympanoplasty at Hyogo College of Medicine Hospital. During this period, 1197 tympanoplasties for cholesteatoma were performed. Fourteen patients (6 males and 8 females; 14 ears) aged 50–72 (mean, 58) years were followed up for 5 years. Labyrinthine fistula were surgically determined and categorized according to the Dornhoffer and Milewski classification [14], in which type I is described as erosion of the bony labyrinthine with an intact endosteum, and type II is a true fistula with an open perilymphatic space. Type II fistula are sub-categorized as either IIa with an open but intact perilymphatic space or IIb with an open perilymphatic space with disrupted perilymph. Type III fistula have an open perilymphatic space with concomitant involvement or destruction of the underlying membranous labyrinthine.

Data regarding pure tone audiometry are presented based on the American Academy of Otolaryngology-Head and Neck surgery (AAO-HNS) criteria (1995). The threshold of 3 kHz was taken from the average of 2 and 4 kHz thresholds because 3 kHz is rarely measured in Japan. Postoperative hearing outcomes were considered successful if the postoperative air-bone gap was within 20 dB.

Data are expressed as means \pm SD. Differences between groups were assessed using a paired *t*-test with the Bonferroni Method and

* Corresponding author at: Department of Otolaryngology, Hyogo College of Medicine, 1-1 Mukogawa-cho, Nishinomiya-City, Hyogo 663 8501, Japan. Tel.: +81 798 45 6493; fax: +81 798 41 8976.

E-mail address: hkatsura@hyo-med.ac.jp (H. Katsura).

Table 1
Postoperative hearing outcomes.

Air-bone gap	5 years	1 year
≤10 dB	1 (7%)	2 (14%)
11–20 dB	7 (50%)	7 (50%)
21–30 dB	4 (29%)	2 (14%)
≥31 dB	2 (14%)	3 (21%)

Rate of successful hearing outcome after 5 years was 57% and did not significantly differ from that (64%) at 1 year after surgery.

the Wilcoxon signed rank test. Differences were considered significant when $P < 0.05$.

3. Results

Fistulae were located in the lateral semicircular canal in all patients and in the superior semicircular canal in one of them. Labyrinthine fistula were surgically determined and categorized as types I and IIa, 10 and 4 patients, respectively. Twelve and two patients underwent single- and two-stage operations, respectively. Most fistula were sealed using cartilage (7/14), fascia (2/14) or both (2/14). One, four and nine patients underwent intact canal wall tympanoplasty, canal wall reconstruction and canal wall-down tympanoplasty, respectively.

Postoperative air-bone gap of less than or equal to 10 dB in 1 case, between 11 and 20 dB in 7 cases, between 21 and 30 dB in 4 cases, and ≥31 dB in 2 cases after 5 years. The rate of successful hearing outcomes after 5 years was 57%, and did not significantly differ from that (64%) at 1 year after surgery (Table 1). Therefore, the different surgical strategies similarly affected the rate of successful hearing outcomes.

Bone conductive hearing at 1 and 2 kHz had improved by 29% and 36% at 1 year, compared with before surgery, but had deteriorated by 64% and 79% at 5 years compared with 1 year. Mean bone conduction hearing levels on the operated side had significantly deteriorated by 5 years after, compared with before and 1 year after surgery (Fig. 1A and B).

Mean bone conduction hearing at 0.5 and 4 kHz had not significantly deteriorated by 5 years after, compared with before

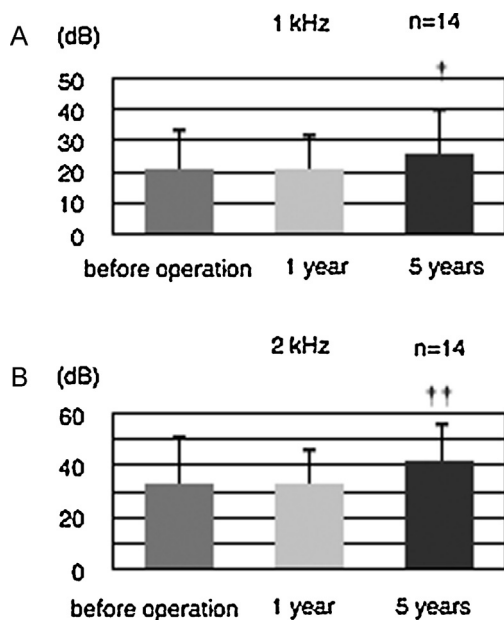


Fig. 1. Mean bone conduction hearing on the operated side. Bone conduction hearing at 1 (A) and 2 (B) kHz had significantly deteriorated by 5 years after, compared with before and 1 year after surgery (* $P < 0.05$, ** $P < 0.01$).

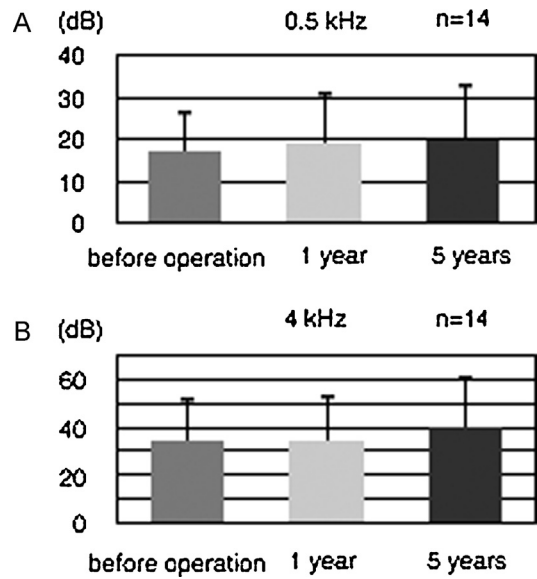


Fig. 2. Mean bone conduction hearing on the operated side. Bone conduction hearing at 0.5 (A) and 4 (B) kHz did not significantly deteriorate by 5 years after, compared with before and 1 year after surgery.

and 1 year after surgery (Fig. 2A and B) and that on the healthy side did not significantly differ over 5 years (Fig. 3A–D).

4. Discussion

The management of fistula remains a controversial issue. Palva and Ramsay [15] recommended a single-staged removal of the matrix in all patients. Horzog et al. [5] reported that the bone conduction pure tone average did not change in most patients after a one-stage operation. Sanna et al. [16] recommended a staged, closed technique in which the matrix is removed in a planned second operation. Sheehy and Brackmann [6] recommended a two-stage procedure if the fistula is large or appears infected. When we identify fistula, we remove the cholesteatoma matrix in a one-stage procedure if it is easily resectable. Here, two patients with large cholesteatomas underwent a two-stage operation. However, hearing outcomes did not differ among surgical approaches in the present study.

Hearing outcomes also did not differ among stages of fistula in the present study. Quaranta et al. [17] recently described a new classification system that takes the size and depth of labyrinthine fistula into consideration. Ikeda et al. [9] also reported that the depth of fistula does not correlate with postoperative bone conduction hearing. However, fistula > 3 mm are associated with the potential for a total loss of bone conduction hearing.

Several authors have described some improvements in bone conduction after surgery. Sheehy and Brackmann [6], Palva and Ramsay [15] and Szpunar [18] reported improvements in 6 of 83, 4 of 29, and 7 of 48 patients, respectively. Kobayashi et al. [12] described >30 dB improvement in bone conduction hearing in five patients with labyrinthine fistula caused by extensive cholesteatoma. The present study found that postoperative bone conduction hearing improved over 1 year, but deteriorated over 5 years. Recently, some authors [19,20] reported that patients with dehiscence of the superior semicircular canal exhibit auditory symptoms including decreases in the sensitivity to low-frequency air conducted sound and increase in the sensitivity to low-frequency bone conducted sound. Rosowski et al. [21] said the third window might explain improved bone-conduction thresholds observed in patients with fistula of the lateral canal caused by chronic otitis media. This opinion suggests that closure of third

Download English Version:

<https://daneshyari.com/en/article/8755405>

Download Persian Version:

<https://daneshyari.com/article/8755405>

[Daneshyari.com](https://daneshyari.com)