

The Prevalence of Labyrinthine Fistula in Chronic Otitis Media Surgery in Shiraz, Southern Iran

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Abstract

Background: The incidence of fistulas found during surgery for chronic otitis media with cholesteatoma has been reported to vary widely in different geographical areas. To identify the prevalence of labyrinthine fistula in the south of Iran.

Patients and Methods: This was a prospective cross-sectional study of 787 consecutive tympanoplasty surgeries with or without mastoidectomy for chronic otitis media (504 ears in 462 patients). The preoperative clinical data, preoperative and postoperative hearing status, and intraoperative findings were analyzed.

Results: A labyrinthine fistula was found at surgery in 24 (4.7%) of 504 ears in the 462 patients undergoing surgery for chronic otitis media. The location of the fistula was the lateral semicircular canal in 23 ears, posterior semicircular canal in 1 ear, and promontory in one ear. There was a statistically significant difference in preoperative and postoperative Air Conduction (AC) threshold in 500-3000 Hz frequency and Air-Bone Gap (ABG) 500-3000 Hz, but there were no statistically significant differences in the other variables.

Conclusions: There is no universal method of reporting hearing outcomes in labyrinthine fistula surgery. Hearing evaluation methods in the literature are poorly comparable due to the usage of different methodologies.

Keywords: Otitis media; Cholesteatoma; Tympanoplasty

Introduction

Labyrinthine fistulae are abnormal communications between the inner ear and surrounding structures (1). Bone resorption of the otic capsule is generally a consequence of longstanding otitis media with cholesteatoma. Only in rare cases or in postmortem studies has bone resorption been associated with inflammatory ear abnormalities other than cholesteatoma (2, 3). The incidence of fistulas found during surgery for chronic otitis media with cholesteatoma has been reported to vary widely in different geographical areas, ranging between 2.9% and 12.5% (4). Management and surgical techniques have accordingly been controversial topics in the literature (5). We designed this study to identify the incidence of labyrinthine fistula in the south of Iran.

Patients and Methods

This was a cross-sectional study of 787 consecutive tympanoplasty surgeries with or without mastoidectomy for chronic otitis media (504 ears in 462 patients). The operations were performed between 2003 and 2008 at Dastghaib Teaching Hospital of Shiraz University of Medical Sciences, which is a large otologic referral center in the south of Iran. The preoperative clinical data included the patient's gender and age, presence of vertigo, preoperative (1 week before surgery) and postoperative (3 months after surgery) hearing status, symptoms, and physical findings as reported in a questionnaire. Chi square (χ^2) and paired t tests were performed in order to identify associations between variables.

Results

There were a total of 787 ear surgeries on 462 patients [240 (52.0%) female and 222 (48.0%) male patients]. Forty-six (10.0%) patients were in the pediatric age group

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(7-15 years) and 416 (90.0 %) were in the adult age group. There was no statistically significant difference in the incidence of labyrinthine fistula between the pediatric and adult groups. A labyrinthine fistula was found at surgery in 24 (4.7 %) ears of the total 504 ears belonging to 462 patients undergoing surgery for chronic otitis media. There were two cases in which the lateral semicircular canal was blue-lined (0.4 %). A fistula test was positive in 12 out of 24 patients (50 %). The clinical signs and symptoms of the 24 patients with labyrinthine fistula included subjective hearing loss (24 patients), otorrhea (19 patients), otalgia (16 patients), tinnitus (15 patients), and vertigo (10 patients). Of the 24 patients with labyrinthine fistulas, cholesteatoma was found in the mastoid or middle ear in 21 ears (87.5 %), and both cholesteatoma and granulation tissue were found in 3 ears (12.5 %). The location of the fistula was the lateral semicircular canal in 23 ears, posterior semicircular canal in 1 ear, and promontory in 1 ear. Two ears had more than one fistula: both had fistulas in the lateral semicircular canal and the posterior semicircular canal. There were 6 cases of labyrinthine fistula

with a size of less than 2 mm, and 19 cases with a size of 2-4 mm. None of the fistulas were > 4 mm. There were 5 (20.8 %) deaf ears preoperatively, which were omitted from the hearing evaluation. Therefore, hearing evaluation was performed in 19 cases with labyrinthine fistula. There were 11 (57.9 %) ears with conductive hearing loss and 8 (42.1 %) ears with mixed hearing loss. Anacusis did not occur postoperatively, and a hearing improvement of more than 10 dB in Speech Reception Threshold (SRT) occurred in 4 (20.0 %) ears. The fistulas were sealed with a cortical bone chip and bone wax (8 patients, 33.3 %), temporalis fascia and bone wax (8 patients, 33.3 %), cortical bone chip and temporalis fascia (5 patients, 20.8 %), and cortical bone chip, temporalis fascia, and bone wax (3 patients, 12.5 %). There was a statistically significant difference in preoperative and postoperative AC threshold in the 500-3000 Hz frequency range and ABG 500-3000 Hz ($P < 0.05$); however, there were no statistically significant differences in other variables (Table 1). There were 15 (62.5 %) cases of facial nerve dehiscence in patients with labyrinthine fistula while 61 (12.7 %) in other cases (OR = 11.4, $P < 0.001$).

Table 1. The preoperative and postoperative hearing status in patients with labyrinthine fistula

Hearing status (n = 19)	Mean ± SD	P value
SDS ^a pre	15.8 ± 87.3	0.078
SDS post	17.8 ± 80.8	
SRT ^b pre	16.8 ± 56.8	0.073
SRT post	14.0 ± 52.4	
BC ^c 500-3000 pre	17.3 ± 22.9	0.919
BC 500-3000 post	18.2 ± 22.6	
AC ^d 500-3000 pre	20.5 ± 62.1	0.035
AC 500-3000 post	17.8 ± 54.7	
BC 4000 pre	28.0 ± 32.6	0.293
BC 4000 post	24.1 ± 28.4	
AC 4000 pre	25.5 ± 66.8	0.226
AC 4000 post	23.9 ± 60.5	
ABG ^e 500 pre	17.3 ± 42.9	0.039
ABG 500 post	18.5 ± 32.1	
ABG 1000 pre	16.5 ± 42.1	0.016
ABG 1000 post	15.9 ± 28.9	
ABG 2000 pre	14.8 ± 36.1	0.040
ABG 2000 post	13.9 ± 26.1	
ABG 3000 pre	14.0 ± 36.8	0.043
ABG 3000 post	14.2 ± 28.7	
ABG 4000 pre	13.0 ± 36.3	0.298
ABG 4000 post	16.8 ± 31.3	

^a SDS: Speech discrimination score

^b SRT: Speech reception threshold

^c BC: Bone conduction

^d AC: Air conduction

^e ABG: Air-bone gap

Discussion

The incidence of labyrinthine fistula was 4.67 % in our study, and this is within the range of the incidence of labyrinthine fistula quoted in the literature. Overall, the incidence of labyrinthine fistulas secondary to chronic otitis media in the modern literature varies from 3 % to 13 % (2-8) Hakuba *et al.* recently reviewed 375 revision surgeries performed for recurrent chronic otitis media. Labyrinthine either fistulas or fistulae were recognized at revision surgery in 29 ears (7.73 %) (1, 2). All ear surgeries in Hakuba's study were for recurrent chronic otitis media; however, in the present study, most of the revision surgeries were performed for second look as a confirmatory surgery. This may explain the difference between our results and those of Hakuba. In our study, the location of the fistula was the lateral semicircular canal in 95.83 % of cases. In Grewal *et al.*'s study, the location of the fistula was the lateral semicircular canal in 96 % of cases (7). Most studies have reported the incidence of isolated lateral canal fistulas to be approximately 80 %; however, the figure ranges from 57 % to 91 % (3, 4, 6, 8). Our findings are consistent with the findings of these studies. In our department, we normally conduct canal wall-down mastoidectomy in cases of cholesteatoma with labyrinth involvement, owing to the socioeconomic characteristics of the population, who have a high prevalence of extensive cholesteatoma at the first diagnosis. Our method of surgery is similar to that of Gacec *et al.*, (4) Greenberg and Manolidis, (8) Grewa *et al.* (7), and Penido *et al.* (9). Other studies, however, have reported an incidence of between 27 % and 55 % for facial nerve dehiscence in fistula cases (5). The higher incidence of facial nerve dehiscence in fistula cases in our study may be due to the fact that in Iran there is higher number of cases of unsafe chronic suppu-

rative otitis media with more extensive cholesteatoma. Another reason may be that most of our patients present very late due to poor socioeconomic conditions.

The average preoperative deafness in the literature is 8.5 %, the average surgically related deafness (surgical manipulation) is 10 %, and the total deafness rate due to the fistula is 18.5 %. (4, 6) In a review of published data from 25 authors, 85 % of patients were reported as having unchanged or improved hearing postoperatively, whereas 8 % of patients experienced decreased hearing postoperatively. Six percent of patients with labyrinthine fistula experienced a dead ear postoperatively (3). Although the postoperative hearing outcome in our study was similar to that of several other studies, none of our patients experienced deafness as a result of surgical manipulation. Regarding postoperative hearing outcome in labyrinthine fistula repair, hearing evaluation methods have been poorly comparable due to the different methodologies used. A limitation of the present study is that CT scanning of the temporal bone was not performed preoperatively for most of the patients. Although the need for preoperative imaging in cholesteatoma cases is debatable, recent studies report that CT scans are no more sensitive than history, physical examination, or clinical suspicion when making a decision to explore for labyrinthine fistulae (9, 10). Because of the relatively low incidence of labyrinthine fistula, we suggest the need for future long-term, multicenter studies using the same audiometric measures in order to obtain prospective data for exploring and estimating differences between the methods of repair for labyrinthine fistula.

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Conflict of interest

None declared.

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