Ten-year results of canal wall down mastoidectomy for acquired cholesteatoma

Eero Vartiainen *

Department of Otolaryngology, Kuopio University Hospital, FIN-70210 Kuopio, Finland

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Abstract

Objective: To examine 10-year results of canal wall down mastoidectomy (CWDM) for acquired cholesteatoma. Methods: Medical records of 136 patients with cholesteatoma who had undergone CWDM in a university hospital and who had a follow-up of at least 10 years were checked. Results: During follow-up, 21% of patients had undergone one revision operation and 3% two revisions. The recurrence rate of cholesteatoma was 17% and in three patients the cholesteatoma recurred twice. Ten years after CWDM, 98% of the operated ears were dry, 1% moist, and one ear (0.7%) was discharging. The tympanic membrane was intact in 92% and perforated in 8%. Only 14% of patients had hearing levels of 20 dB or better and 46% had 40 dB or better. Conclusion: It is concluded that the surgical technique of CWDM should be improved in order to lower the recurrence rate and to improve hearing results. © 2000 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

When presenting results of surgical treatment for cholesteatomatous chronic otitis media, a sufficiently long follow-up period is essential because, for instance, the recurrence rate of cholesteatoma has been found to be related to the length of observation time [1]. Although results of chronic ear surgery have been widely published in the otologic literature, there are few studies with prolonged follow-up. Kinney [2] evaluated 90 patients undergoing intact canal wall mastoidectomy for cholesteatoma after a mean follow-up of 9.2 years (range, 7–12 years) and found a cholesteatoma recurrence rate of 25%. Lau and Tos [3] reported a recurrence rate of 10% in patients with sinus cholesteatoma on average 9.75 years after mastoidectomy. The same authors [1] examined patients with attic cholesteatoma after a mean follow-up of 11 years (range, 3–21 years) and observed a recurrence rate of 6.3%. Kapur and Jayarmachandran [4] reported results of staged combined approach tympanoplasty in a series of 151 patients with cholesteatoma after a mean follow-up of 14.5 years (range, 5–23 years). They detected 40 failures (26.5%), 19 (47.5%) of the failures were due to attic retraction pockets and four (10%) due to large residual cholesteatomas.

The purpose of this study was to analyze results of canal wall down mastoidectomy (CWDM) in patients with cholesteatoma after a follow-up of 10 years.

2. Materials and methods

Between 1976 and 1988, 273 patients with cholesteatomatous chronic otitis media were subjected to CWDM as a primary operation in the Department of Otolaryngology, University Hospital of Kuopio, Finland. One hundred and thirty-six (50%) of them had a follow-up of at least 10 years and these 136 patients form the population of this study. In the remaining 137 patients, the follow-up period varied from 2 to 9 years (mean, 5.2 years). In the majority of these latter patients the follow-up had been discontinued because the operated ear had been considered safe, but some patients either had refused to attend our out-patient department any longer or had moved to another part of the country. Main results of surgical treatment in pa-
patients with follow-up of less than 10 years are presented for comparison.

As a rule, all large cholesteatomas (extending beyond the facial nerve canal) were treated using CWDM.

Between 1976 and 1988, 61 patients with small cholesteatomas underwent canal wall up mastoidectomy or atticotomy or tympanoplasty without mastoidectomy and were excluded from the study.

The surgical technique of CWDM has been published previously [5]. Briefly, through a postauricular incision a complete mastoidectomy was first performed, the posterior canal wall and the lateral wall of the attic were removed, and then the cholesteatoma and diseased mucosa were exenterated. The mastoidectomy cavity was obliterated using anteriorly based musculoperiosteal flap and, in large mastoid air cell systems, with cortical bone chips. Ossicular reconstruction was performed using autologous ossicle or cortical bone. Myringoplasty was done using temporal muscle fascia as graft material.

Air and bone conduction thresholds were determined using a clinical audiometer calibrated according to ISO standards. Hearing level was defined as the mean air conduction thresholds at 0.5, 1 and 2 kHz. Postoperative air–bone gap was calculated comparing the mean postoperative air conduction thresholds with the mean preoperative bone conduction thresholds at 0.5, 1 and 2 kHz.

3. Results

There were 54 (40%) female patients and 82 (60%) male patients. Age distribution of patients at the time of the primary operation is shown in Fig. 1. Ten patients (7%) had been subjected to a planned second-stage operation 8–12 months after the primary mastoidectomy, the remaining 126 patients (93%) underwent one-stage CWDM.

At the time of surgery, 42 ears (31%) were dry and 94 ears (69%) were discharging or moist. In 60 ears (44%) the cholesteatoma originated from the attic area, in 54 ears (40%) from the tympanic sinus, and 22 ears (16%) had a pars tensa cholesteatoma [5]. At surgery, the cholesteatoma was found to be confined to the tympanic cavity and/or attic in 58 ears (43%), in 64 ears (47%) the cholesteatoma extended to the antrum and in 14 ears (10%) filled the entire mastoid air cell system. Complications caused by the disease included two cases of facial paralysis and four cases of labyrinthine fistula.

During follow-up, cholesteatoma recurred in 23 patients (17%) and after revision the cholesteatoma recurred again in three patients (2% of the total series). A total of 28 patients (21%) underwent one revision operation and four patients (3%) two revisions. Reasons for revisions are presented in Table 1.

In patients with follow-up of less than 10 years, the cholesteatoma recurrence rate was 8.8% (12 out of 137), significantly ($P < 0.05$, the $\chi^2$ test) lower than in patients with follow-up of 10 years. Seventeen (12%) of the former patients had undergone revision surgery, in this respect the difference between the two patient groups was not significant ($P > 0.05$, the $\chi^2$ test).

Ten years after the primary operation, 133 (98%) of the ears operated on were dry, two (1%) were moist and one ear (0.7%) was discharging. The tympanic membrane was intact in 125 ears (92%) and perforated in 11 ears (8%).

Audiograms of two patients were missing, hearing levels of the remaining 134 patients are shown in Table 2. Only 14% of patients had hearing levels of 20 dB or better and 46% had 40 dB or better. There were seven totally deaf ears (5%).
Air-bone gaps related to the pathology of the ossicular chain at the primary operation can be seen in Table 3. Ears with intact ossicular chain had the best results and ears with missing stapes superstructure had the greatest postoperative air-bone gaps.

Hearing levels of patients with follow-up of less than 10 years did not differ significantly (\(P = 0.36\), Mann–Whitney \(U\) test) from those of patients with follow-up of 10 years. The median hearing level of the former patient group was 36.0 and 42.0 dB for the latter.

### 4. Discussion

Chronic otitis media with cholesteatoma is a potentially dangerous disease because it can lead to life-threatening intracranial complications. Cholesteatoma is also a burdensome disease for the patient. In this series, 28\% of patients underwent two major operations and 3\% even three, in addition to numerous visits at the outpatient department. The ideal treatment for cholesteatoma is an one-stage procedure which can completely eradicate the disease and prevent its recurrence.

Most studies on the results of cholesteatoma surgery have revealed lower recurrence rates after CWDM than after canal wall up mastoidectomy [6–8], although also equally good results have been published [1]. Our treatment policy has been to use CWDM for all large cholesteatomas (extending beyond the facial nerve canal) whereas only patients with small cholesteatomas have been subjected to canal wall up procedures. We think that in most cases removal of the posterior canal wall is essential for total eradication of cholesteatoma. Yet, the long-term recurrence rate (17\%) observed in this study is too high. Obviously, our surgical technique should be improved, for instance, by the use of side-viewing rigid endoscopes.

It is generally held that hearing results of canal wall up mastoidectomy are better than those of CWDM, although also equally good results have been reported, especially in studies with long follow-up [7,9]. Our functional results are not so encouraging. Ten years after CWDM, only 14\% of patients had hearing levels of 20 dB or better and 46\% had 40 dB or better. In many patients with poor hearing outcome the tympanic mucosa had to be totally removed because of severe pathology. In these ears we have used silastic sheeting in order to prevent formation of adhesions but in many cases the tympanic cavity eventually turned into totally fibrotic, leading to poor hearing result. Apparently, most of these patients suffer from permanent dysfunction of the Eustachian tube. Hopefully, the future otologic research will produce us a treatment for this difficult condition.

### References