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Chronic Tinnitus Resulting from Cerumen Removal Procedures

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Abstract: This study was undertaken to determine how many cases of chronic tinnitus in a clinic population resulted from cerumen removal procedures and to summarize cerumen management methodologies and recommendations that will reduce the likelihood of such serious complications. Detailed questionnaires were mailed to 2,400 consecutive patients (1,704 male, 696 female; mean age, 53.3 ± 11.8 years; age range, 7–87 years) prior to their initial appointment at the Oregon Health & Science University Tinnitus Clinic between 1986 and 2000. These questionnaires requested information about patients' medical, hearing, and tinnitus histories. Records were analyzed to determine how many patients reported that their chronic tinnitus began as a result of cerumen removal procedures. Of 2,400 patients, 11 (0.46%) reported that their tinnitus began as a result of cerumen removal procedures performed by clinicians. Three additional patients reported that chronic tinnitus began as a result of their *own* attempts to clean their ear canals. Chronic and debilitating conditions, such as hearing loss and tinnitus, can occur as results of attempts to remove cerumen. By following the recommendations of experts in cerumen management techniques, clinicians can reduce the likelihood of catastrophic complications and subsequent litigation.

Key Words: cerumen; ear wax; management; removal; tinnitus

Irrigation of the external auditory canal to remove cerumen is performed on more than 150,000 ears per week in the United States [1]. In their survey of general practitioners, Sharp et al. [2] reported that serious complications (those requiring referral to a specialist) occurred in 1 of every 1,000 ears syringed. Complications of cerumen removal can include ear pain; infection; bleeding; dizziness, vertigo, and nausea; hearing loss; tinnitus; perforation of the tympanum; and otitis [3]. Unfortunately, many articles about cerumen management mention only one or two of these potential complications likely to be encountered by clinicians [4,5]. Most general otolaryngology texts describe cerumen removal procedures [6–9]. However, none of these texts gives a complete listing of complications that might occur as a result of cerumen removal, and none of them mentions tinnitus in this context. The excellent study by Grossan [3] does mention tinnitus as a potential complication of cerumen removal but contains no reference to the fact that tinnitus resulting from this procedure can be chronic and debilitating for a patient. Chronic tinnitus is often associated with insomnia [10], depression [11], anxiety [12], and other conditions that detract from patients' enjoyment and quality of life.

The present study was undertaken (1) to determine how many cases of chronic tinnitus in a clinic population resulted from cerumen removal procedures; (2) to remind clinicians that complications during cerumen removal can produce chronic and debilitating symptoms, such as tinnitus and hearing loss; and (3) to summarize cerumen management methodologies and recommendations that will reduce the likelihood of such serious complications and subsequent litigation.

METHODS

We mailed detailed questionnaires to patients prior to their initial appointment at the Oregon Health & Science University (OHSU) Tinnitus Clinic between 1986

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and 2000. These questionnaires requested information about patients' medical, hearing, and tinnitus histories [13]. Information from these questionnaires was entered into a database known as the *Oregon Tinnitus Data Registry* [14,15]. We analyzed records in this database to determine how many patients reported that their chronic tinnitus began as a result of cerumen removal procedures. These protocols were reviewed and approved by the institutional review board at OHSU. Informed consent was obtained in writing from patients prior to their participation in this study.

RESULTS

We reviewed records from 2,400 consecutive patients who visited our clinic (1,704 male, 696 female; mean age, 53.3 ± 11.8 years; age range, 7–87 years). All the patients experienced (and sought treatment for) chronic tinnitus. Eleven of these patients reported that their tinnitus began soon (immediately to 3 days) after they underwent cerumen removal procedures performed by a clinician. Table 1 lists information related to these patients and the cerumen management procedures that were associated with the onset of their tinnitus.

The average age of these 11 patients (53.2 years) and the fact that 73% of them are men are both consistent with patient demographics in this clinic. The average duration of tinnitus for these 11 patients at the time of their tinnitus clinic appointment was 22.9 months (range, 3 months–7 years). Figure 1 gives the distribution of tinnitus durations for the last 2,337 patients who have been treated in this clinic.

All the patients represented in Table 1 complained of ear pain during the cerumen removal procedure that initiated their tinnitus. Two patients also experienced vertigo and nausea; one patient complained of loud noise exposure produced by the suction apparatus. All these coincident symptoms resolved within a short time. Unfortunately, constant tinnitus remained. Seven of the cerumen removal procedures were performed by otolaryngologists, two by family practice physicians, and two by family practice nurses. Three of these 11 patients filed malpractice lawsuits against clinicians who performed the wax removal procedures.

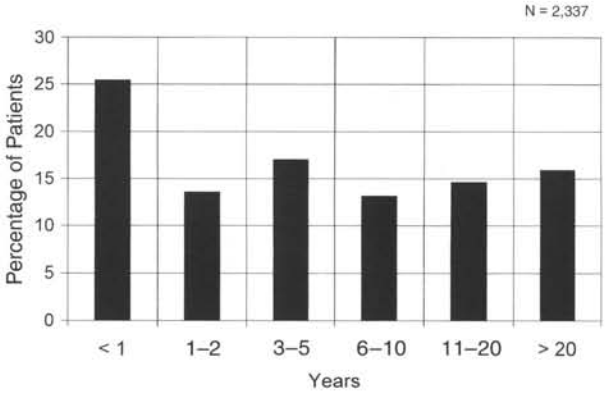

Figure 1. Duration of tinnitus awareness for 2,337 patients.

Patient 1 also experienced mild hearing loss (HL) at 8,000 Hz (threshold increased from 5 to 30 dB HL) in her right ear as a result of curettage. The physician who performed the procedure was not her regular otolaryngologist. Before the physician began this procedure, the patient explained that she has small ear canals and asked him whether he was going to use the microscope, as her doctor usually does. The substitute otolaryngologist decided to use his head mirror without any additional magnification. The patient's threshold for 8,000 Hz tones has remained elevated in her right ear for 2 years since this procedure was conducted. She matched her tinnitus

Table 1. Patients Whose Tinnitus Began As a Consequence of Cerumen Removal Procedures Performed by Clinicians

Patient	Gender	Age* (yr)	Tinnitus Duration*	Time Between Procedure and Onset of Tinnitus	Other Immediate Symptoms	Procedure	Clinician	Outcome
1	F	48	2 yr	Immediate	Pain, vertigo, hearing loss	Curettage	Otolaryngologist	Litigation
2	M	35	6 mo	1 day	Pain	Irrigation	Family practice nurse	Litigation
3	F	56	1½ yr	2 days	Pain	Curettage	Otolaryngologist	—
4	M	33	7 yr	1 day	Pain	Suction	Otolaryngologist	—
5	F	74	16 mo	3 days	Pain, vertigo	Curettage	Otolaryngologist	—
6	M	58	22 mo	2 days	Pain, noise trauma	Suction	Otolaryngologist	—
7	M	69	3½ yr	Immediate	Pain	Irrigation	Family practice physician	—
8	M	41	15 mo	Immediate	Pain	Irrigation	Family practice nurse	—
9	M	79	3 mo	Immediate	Pain	Curettage	Otolaryngologist	—
10	M	44	7 mo	Immediate	Pain	Irrigation	Family practice physician	—
11	M	48	15 mo	Immediate	Pain	Irrigation	Otolaryngologist	Litigation

*At time of tinnitus clinic appointment.

Table 2. Patients Whose Tinnitus Began as a Result of Self-Administered Cerumen Removal Procedures

Patient	Gender	Age* (yr)	Tinnitus Duration*	Time Between Procedure and Onset of Tinnitus	Other Immediate Symptoms	Procedure
12	F	64	4½ yr	A few minutes	None	Application of H_2O_2 to external auditory canal
13	M	66	7 yr	Immediate	None	Application of OTC ear drops to external auditory canal
14	F	37	5 yr	Immediate	Pain, bleeding, vertigo, nausea	Pushed too hard with cotton swab into external auditory canal

*At time of tinnitus clinic appointment.

to a band of noise between 7 and 11 kHz at 28 dB sensation level (SL) in her right ear.

At the time of her tinnitus clinic appointment, patient 3 had elevated pure-tone thresholds from 3,000 to 8,000 Hz in her left ear as compared to thresholds in the right. The painful curettage that triggered tinnitus was performed on her left ear. However, the patient did not have an audiogram that predated this procedure. Therefore, we cannot conclude that the procedure caused both additional hearing loss and tinnitus. The same can be said for patients 2, 5, 7, 8, 9, 10, and 11: All had greater hearing loss in the tinnitus ear (the same ear that experienced pain during cerumen removal), but none of them had on file audiograms that predated the procedure. Three patients not listed in Table 1 reported that chronic tinnitus began as a result of their *own* attempts to clean their ear canals. Their information is detailed in Table 2.

DISCUSSION

Only 11 patients (0.46%) of 2,400 who visited this tinnitus clinic between 1986 and 2000 reported that their tinnitus began as a result of cerumen removal procedures performed by clinicians. Given the number of these procedures conducted every day, this small percentage of serious complications is encouraging. Of course, this statistic applies only to patients who sought treatment in this clinic and should not necessarily be applied to the general population.

Two patients claimed that their own application of ear drops or hydrogen peroxide caused chronic tinnitus to start. One has difficulty in speculating about how ear drops might cause chronic tinnitus. Possibly these patients did not provide entirely accurate or complete accounts of what they did to their ears.

Even though cerumen removal is usually performed with a minimum of complications, an important factor for clinicians to remember is that the potential for initiating chronic conditions (such as hearing loss or tinnitus or both) exists. Several authors have suggested ways in which to minimize the risks associated with cerumen management.

Use of a Microscope

According to Ballachanda and Peers [16], "Microscopes represent state-of-the-art visualization of the tympanic membrane and ear canal because they provide a three-dimensional view, free both hands, and offer variable amounts of magnification." Pender [6] also encouraged clinicians to use an office surgical microscope, especially when wax is impacted and binocular vision (depth perception) becomes a distinct advantage. Dinsdale et al. [1] agreed that "the best control and visualization is obtained when using the operating microscope with curette and suction-irrigation." Roland [7] stated that "better visualization afforded by the operating microscope makes direct removal of cerumen much easier and, therefore, safer. The light source is generally brighter, magnification is retained, and binocular vision permits accurate depth perception."

Softening Impacted Cerumen Before Removal

In the case of impacted cerumen, a different approach is advisable. Schuller et al. [8] suggest the following: "Occasionally, cerumen may be impacted and so dry that it cannot be removed painlessly. In such an instance, the patient is instructed to instill a few drops of hydrogen peroxide or mineral oil daily for 2–3 days to soften the wax. Then it can be removed easily by irrigation."

Use of Cerumenex Drops with Caution

"Cerumenex (triethanolamine and chlorobutanol) should not be used longer than 24 hours, since there is a marked tendency for an allergic reaction to develop. As a rule of thumb, Cerumenex should be avoided unless the ear is lavaged within 30 minutes after application in a supervised office environment" [17].

Evaluating Integrity of Tympanic Membranes

"An attempt should be made to determine the condition of the tympanic membrane before attempting cerumen removal. If the drum cannot be seen sufficiently to test its integrity by insufflating the canal with a balloon attached to the otoscope, one should at least inquire about any history of perforation or drainage. If there is any doubt, one should assume that the drum is not intact or is at least vulnerable to injury" [9].

Control of Irrigation Pressure and Temperature

"Although water pick irrigators are generally safe, tympanic membrane perforation and even more serious otologic injuries from these instruments have been reported; therefore, the lowest effective pressure should be used to prevent mechanical trauma" [7]. Grossan [3] recommended that the Reiner-Alexander ear syringe should not be used because its "pressure is poorly controlled and the tip can block the ear canal, producing enormous pressure." Instead, he recommended other types of irrigators that allow the practitioner to control water pressure and direction perfectly. Grossan [3] also recommended that oral jet irrigators should not be used because "this type of irrigation causes unacceptable trauma to the stapes and cochlea." Dinsdale et al. [1] demonstrated that oral jet irrigators can generate enough force to rupture the tympanic membrane. Therefore, the irrigation stream should be aimed at the superoposterior region of the ear canal, not directly at the ear drum. Irrigation water temperature should be maintained between 37° and 38°C. Water that is too cold or too warm can induce vertigo in patients.

Adequate Training

In their survey of general practice physicians in Scotland, Sharp et al. [2] reported that only 19% of the doctors always performed wax removal procedures themselves; the majority of physicians routinely delegated the remaining cases to nurses, some of whom had received no instruction. Sharp et al. concluded that the incidence of complications associated with cerumen management could be reduced by "a greater awareness of the potential hazards, increased instruction of personnel, and more careful selection of patients."

Listening to Patients

Grossan [3] offered this advice: In both complex and simple cases, the procedure should never be continued beyond the patient's comfort level. Figure 2 is an example of what *not* to do during curettage, although this diagram was included in a study by Freeman [5] as a how-to illustration. A curette in that position prying cerumen away from the tympanum would undoubtedly cause pain for the patient and could also produce hearing loss, chronic tinnitus, and other serious complications. Freeman recommended that "if the wax is hard, use a right-angle hook" with no suggestion that softening agents should be used. This recommendation is a recipe for disaster.

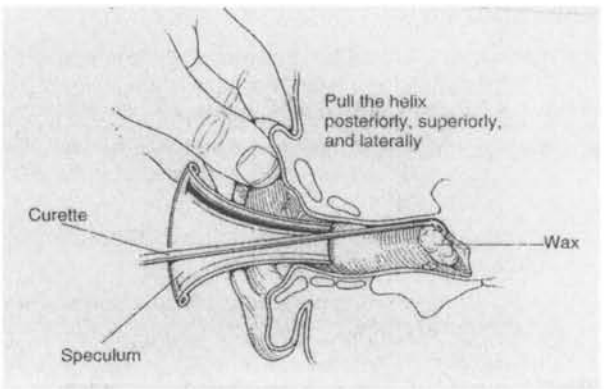

Figure 2. How *not* to remove cerumen via curettage. The curette in this position (prying cerumen from the tympanum) will surely cause pain for the patient and can also result in hearing loss, chronic tinnitus, and other serious complications. (*Source:* Reproduced with permission from RB Freeman, Impacted cerumen: How to safely remove earwax in an office visit. *Geriatrics* 50(6):53, 1995. Copyright by Advanstar Communications, Inc. Advanstar Communications, Inc., retains all rights to this article.)

CONCLUSIONS

Thousands of cerumen removal procedures are performed daily with no problems. However, clinicians should remain aware of the fact that serious complications can occur, especially if these procedures are conducted without the utmost care and caution. Complications associated with cerumen removal can include bleeding, ear pain, infection, dizziness, vertigo, and nausea. Although unpleasant for patients, these symptoms usually resolve within a relatively short time. Chronic and debilitating conditions, such as hearing loss and tinnitus, can also occur as results of careless or inexperienced attempts to remove cerumen. By following the recommendations of experts in cerumen management techniques, clinicians can avoid catastrophic complications and subsequent litigation.

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