Cerumen Impaction

DANIEL F. McCARTER, MD, A. URSULLA COURTNEY, MD, and
SUSAN M. POLLART, MD, *University of Virginia Health System, Charlottesville, Virginia*

Cerumen is a naturally occurring, normally extruded product of the external auditory canal. It is usually asymptomatic, but when it becomes impacted it can cause complications such as hearing loss, pain, or dizziness. It also can interfere with examination of the tympanic membrane. Depending on available equipment, physician skill, and patient circumstances, treatment options for cerumen impaction include watchful waiting, manual removal, the use of ceruminolytic agents, and irrigation with or without ceruminolytic pretreatment. The overall quality of the evidence on treatment is limited. Referral to an otolaryngologist for further evaluation is indicated if treatment with a ceruminolytic agent followed by irrigation is ineffective, if manual removal is not possible, if the patient develops severe pain or has vertigo during irrigation, or if hearing loss is still present after cerumen has been removed. The use of cotton swabs and ear candles should be avoided. (Am Fam Physician 2007;75:1523-28, 1530. Copyright © 2007 American Academy of Family Physicians.)

▶ **Patient information:** A handout on earwax, written by the authors of this article, is provided on page 1530.

Cerumen (i.e., earwax) is composed of secretions and sloughed epithelial cells and hair from the external auditory canal. It protects the skin in the canal and is naturally extruded. However, cerumen may accumulate and occlude the canal of one or both ears, causing discomfort, hearing loss, tinnitus, dizziness, and chronic cough. It also can contribute to otitis externa.[1-3] Because the external auditory canal is innervated by the auricular branch of the vagus nerve, coughing or even cardiac depression can accompany stimulation of the canal from cerumen impaction or removal attempts.[1,3,4]

Cerumen impaction is present in approximately 10 percent of children, 5 percent of normal healthy adults, up to 57 percent of older patients in nursing homes, and 36 percent of patients with mental retardation.[1] An anatomic deformity and an increased number of hairs in the external auditory canal, as well as physical barriers to natural wax extrusion (e.g., cotton swabs, hearing aids, earplug-type hearing protectors) have been associated with an increased incidence of cerumen impaction.[1,5,6] Cerumen removal is the most common ear, nose, and throat (ENT) procedure performed in primary care; approximately 4 percent of primary care patients will consult their physician for cerumen impaction.[7]

Diagnosis

Cerumen impaction is diagnosed by direct visualization with an otoscope. Foreign bodies and a swollen canal from otitis externa can impair tympanic membrane visualization and should be ruled out before attempting cerumen removal. Impaction is a common cause of hearing impairment in older patients and in patients with mental retardation; therefore, it is reasonable to evaluate for cerumen impaction in patients with hearing problems. Similarly, it is appropriate to examine for cerumen impaction in older patients and in patients with mental retardation upon admission to a hospital or institution, as well as periodically thereafter. In one study, 35 percent of hospitalized patients older than 65 years had cerumen impaction and 75 percent of those had improved hearing after documented earwax removal.[5]

Because cerumen serves a protective function for the skin in the external auditory canal, removal has been associated with complications including otitis externa,

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	*Evidence rating*	*References*	*Comment*
The use of ceruminolytics alone (without irrigation) becomes more effective with longer treatment duration, but it may only clear earwax up to 40 percent of the time.	B	13	Systematic review of lower quality studies
The use of ceruminolytics may improve the effectiveness of irrigation.	B	13	Systematic review of lower quality studies
Applying water or a ceruminolytic 15 to 30 minutes before irrigation is as effective as applying a ceruminolytic for several days before irrigation.	B	13, 25	Systematic reviews of lower quality studies
No ceruminolytic is superior to any other or to saline.	B	11-13	Systematic reviews of lower quality studies
Ear candling should be avoided.	C	29, 30	In vitro evaluation in a small case series and an epidemiologic survey

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 1430 or http://www.aafp.org/afpsort.xml.

pain, dizziness, syncope, tinnitus, tympanic membrane perforation, and even cardiac arrest. Routine examination is not indicated except in the specific populations mentioned above, when specific complaints are potentially related to cerumen impaction, or if the physician needs to evaluate the tympanic membrane as part of an examination.[4,8-10]

Treatment

Cerumen removal may be attempted by irrigation of the external auditory canal, with or without the use of ceruminolytics; by ceruminolytics alone; or by manual removal using a curette, forceps, or suction. Systematic reviews and one meta-analysis have evaluated these treatment options.[11-15] The body of evidence on treatment of cerumen impaction is limited, highlighting a need for well-designed, randomized trials to better inform clinical practice.

Manual removal with a curette is a long-recognized method for clearing the ear canal and is considered effective, but no published trials have compared it (or any other manual method) with other removal methods.[11] There also are no controlled trials comparing the different irrigation tools.

The available data, gathered mainly in emergency department and office settings, primarily compare various ceruminolytic agents used alone or in preparation for irrigation.[11-15] One small study comparing ceruminolytics with watchful waiting found that 5.3 percent of patients who were not treated had complete clearing of impacted cerumen and 26.3 percent had moderate clearing after five days.[16]

MANUAL REMOVAL

Manual removal involves the use of a metal or plastic loop or spoon. It generally is considered effective, but there are no trials comparing it with other methods for effectiveness or safety.[11] Manual removal does not expose the ear canal to moisture and, therefore, may lessen the risk of infection. To minimize the risk of trauma to the external auditory canal or tympanic membrane, a cooperative patient and more clinical skill than other methods are required.[17,18]

Other advantages of manual removal are that it often is quicker and allows direct visualization of the procedure via a hand-held monocular otoscope or floor- or wall-mounted binocular microscope. The use of a binocular microscope will improve depth perception and may enhance comfort and safety, but availability is generally limited to otolaryngology offices.

IRRIGATION

Irrigation may be attempted alone or with a ceruminolytic pretreatment. There are different irrigation methods available in the office setting. Ear syringes are inexpensive and readily available, but some can be slow, poorly balanced, or cause minor ear trauma.[10,18,19] Oral jet irrigators are fast, portable, and inexpensive; however, they also have been associated with some trauma, including tympanic membrane perforation.[9,10,18,19] The risk of tympanic membrane perforation can be lessened by using an ear irrigator tip (Hydro Med, Sherman Oaks, Calif.), which keeps water from hitting the eardrum and eliminates pressure buildup.[10,19] It also is possible to improvise an irrigation system using a 20- to 30-cc syringe with either a plastic catheter from a butterfly needle (being careful to remove the needle and wings) or an 18-gauge plastic intravenous catheter.[19] Regardless of the system, the irrigant should be at body temperature to prevent a caloric-reflex response.

Gentle traction should be placed upward and backward on the external ear to help straighten the external auditory canal.[19] The water should be instilled gently and the canal should be checked intermittently for clearance of the cerumen. Irrigation should not be done if a tympanic membrane perforation or myringotomy tube is present. In addition, patients with a history of middle-ear disease, ear surgery, radiation therapy to the area, severe otitis externa, sharp foreign objects in the external auditory canal, or vertigo should not undergo irrigation.[19] Although irrigation is considered to be effective and safe, there are no studies comparing it with other removal methods.[11] One study did show that irrigation alone was effective approximately 70 percent of the time.[20]

CERUMINOLYTICS

There are three types of cerumen-softening preparations: water-based, oil-based, and non–water-based/non–oil-based *(Table 1[16,20-22])*. Water-based and non–water-based/non–oil-based agents increase cerumen miscibility, whereas oil-based preparations lubricate the wax.[13,21,23] Water-based preparations include triethanolamine polypeptide oleate condensate, docusate sodium, 3% hydrogen peroxide, 2.5% acetic acid, 10% sodium bicarbonate, and water or saline.

Based on current evidence, no ceruminolytic appears to be superior to saline.

Non–water-based/non–oil-based preparations include carbamide peroxide (Debrox), as well as choline salicylate and glycerol (e.g., Earex Plus, Audax [brands are not available in the United States]) and ethylene oxide polyoxypropylene glycol (Addax [brand is not available in the United States]).

Oil-based preparations include arachis (i.e., peanut) oil–based products (e.g., Earex, Cerumol, Otocerol [brands are not available in the United States]), olive oil, almond oil, and mineral oil.[13] As with irrigation, ceruminolytics should be avoided in patients with a suspected breach of the tympanic membrane from previous surgery, insertion of myringotomy tubes, or tympanic membrane perforation.

Ceruminolytics Alone. In one systematic review of topical ceruminolytics, investigators concluded that triethanolamine was better than saline and that longer treatment duration with softening agents was better than a shorter duration (14, 19, and 35 percent clear at one, three, and four days, respectively; $P < .0001$); these were the only statistically significant findings. The review also found that the effect of docusate sodium was not statistically different from that of triethanolamine or saline.[13] The review included one randomized controlled trial that incorporated an untreated control group.[16] It found no statistically significant difference between ceruminolytic therapy and no treatment.[16] Although longer treatment duration appeared to increase the effectiveness of ceruminolytics alone, overall effectiveness is still uncertain because of the evidence limitations.[13]

Ceruminolytics Before Irrigation. Current evidence suggests that the use of ceruminolytics may improve irrigation success by as much as 97 percent.[13] In studies evaluating the use of a ceruminolytic agent before irrigation, researchers found that triethanolamine (a water-based preparation)

Table 1. Cerumen-Softening Agents for Cerumen Removal

Agent	*Use*	*Dosing*	*Comment*
Water-based			
10% Triethanolamine polypeptide oleate condensate	Soften cerumen before irrigation	Fill affected ear canal 15 to 30 minutes before irrigation	Can be irritating to the ear canal and should not be used for a prolonged period
Docusate sodium	Soften cerumen before irrigation	Fill affected ear canal with 1 cc 15 to 30 minutes before irrigation	In one study, one fifth of tympanic membranes were visualized without irrigation[22]
3% Hydrogen peroxide	Soften cerumen before irrigation	Fill affected ear canal 15 to 30 minutes before irrigation	If not completely removed, bubbling may interfere with ability to visualize tympanic membrane
2.5% Acetic acid	Home treatment of impacted cerumen	Fill affected ear with 2 to 3 cc twice daily for up to 14 days[22]	More effective in children than in adults[22]
10% Sodium bicarbonate	Soften cerumen before irrigation or as an alternative to irrigation	Fill affected ear with 2 to 3 cc 15 to 30 minutes before irrigation, or alternatively for three to 14 days at home with or without irrigation[16,21]	More effective in children than in adults[22]
Water or saline	Soften cerumen before irrigation	If irrigation is attempted without softening and is ineffective with the first irrigation attempt, instill water and wait 15 minutes before repeating irrigation[20]	—
Non–water-based/non–oil-based			
Carbamide peroxide (Debrox)	Soften cerumen before irrigation or as an alternative to irrigation	Put five to 10 drops into the affected ear twice daily for up to seven days	—
50% Choline salicylate and glycerol (e.g., Earex Plus, Audax); ethylene oxide polyoxypropylene glycol (Addax); propylene glycol; 0.5% chlorbutol	Soften cerumen before irrigation or as an alternative to irrigation	Put three drops into the affected ear twice daily for four days	Not all brands and formulations are available in the United States
Oil-based			
57.3% Arachis oil, 5% chlorbutol, 2% paradicholorbenzene, 10% oil of turpentine (e.g., Cerumol)	Soften cerumen before irrigation or as an alternative to irrigation	Fill affected ear with 5 cc twice daily for two to three days	Not all brands and formulations are available in the United States
Arachis oil, almond oil, rectified camphor oil (e.g., Otocerol, Earex)	Soften cerumen before irrigation or as an alternative to irrigation	Put four drops into the affected ear twice daily for up to four days	Not all brands and formulations are available in the United States
Olive oil, almond oil, or mineral oil	Soften cerumen before irrigation	Put three drops into the affected ear at bedtime for three or four days	—

Information from references 16 and 20 through 22.

was more effective than carbamide peroxide (a non–water-based/non–oil-based preparation)[13,24] and that water instilled for 15 minutes before irrigation was more effective than immediate irrigation.[25] No other statistically significant differences were noted in any of the preparations (except those not available in the United States), and there was no difference associated with treatment duration. Use of a ceruminolytic agent 15 to 30 minutes before irrigation was found to be as effective as several days of treatment.[13]

Overall, no ceruminolytics appeared to be superior to saline, making saline an inexpensive first-line agent.[13] Based on current evidence, if treatment with a ceruminolytic agent followed by irrigation is chosen, an initial attempt at irrigation with water should be made. If irrigation is unsuccessful, the water should be instilled and left in the external auditory canal for 15 to 30 minutes, after which another attempt at irrigation should be made. If this second attempt is also unsuccessful, it would be reasonable to use a ceruminolytic for two to three days, followed by another trial of irrigation.[20]

HOME OR ALTERNATIVE TREATMENTS

Home cerumen treatments are not unusual, and many of the treatments mentioned above are available over the counter alone or in earwax removal kits. Cotton ear buds are not definitively associated with cerumen impaction, but they have been implicated in impaction and otitis externa and should be avoided.[26-28]

Ear candling also should be avoided. Ear candling is a practice in which a hollow candle is inserted into the external auditory canal and lit, with the patient lying on the opposite ear. In theory, the combination of heat and suction is supposed to remove earwax. However, in one trial, ear candles neither created suction nor removed wax and actually led to occlusion with candle wax in persons who previously had clean ear canals. Primary care physicians may see complications from ear candling including candle wax occlusion, local burns, and tympanic membrane perforation.[8,29,30]

Criteria for Appropriate Referral

If the patient develops severe pain with attempted wax removal, lubricating the canal with olive oil for a few days with additional removal attempts can be tried. If pain persists, further removal attempts should cease and a referral should be made to an otolaryngologist. If vertigo develops during irrigation with water at body temperature, perilymphatic fistula or perforation of the oval window should be considered and referral to an ENT subspecialist should be made. Referral should be considered in patients with a very swollen ear canal, an unusual anatomy, or a history of tympanic membrane perforation, radiation, or surgery.[10,18] A formal hearing evaluation should be considered in patients with hearing deficits or continued hearing loss after wax removal.

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The Authors

DANIEL F. McCARTER, MD, is an associate professor of clinical family medicine in the Department of Family Medicine at the University of Virginia Health System in Charlottesville. He received his medical degree from and completed a family medicine residency at the University of Virginia.

A. URSULLA COURTNEY, MD, is an assistant professor of clinical family medicine in the Department of Family Medicine at the University of Virginia Health System. She received her medical degree from and completed a family medicine residency at the University of Virginia.

SUSAN M. POLLART, MD, is an associate professor of clinical family medicine and the assistant dean for faculty development at the University of Virginia Health System. She received her medical degree from and completed a family medicine residency at the University of Virginia.

Address correspondence to Daniel F. McCarter, MD, University of Virginia Department of Family Medicine, UVA Health System, Box 800729, Charlottesville, VA 22908 (e-mail: dmccarter@virginia.edu). Reprints are not available from the authors.

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