

Cerumen in Children: A Neglected but Fundamental Problem

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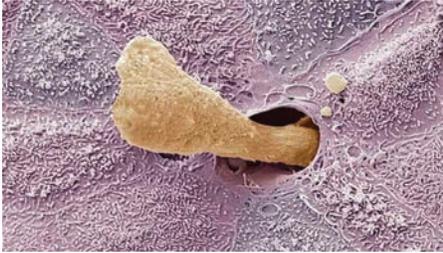


Figure 1. Cerumen secreted by a gland in the ear canal.

lence ranging from to about 2% in normal adults to 40% of elderly people living in nursing homes ⁴. It is reported that about 1 out of 10 children have excessive or impacted cerumen, but the data refer to outdated studies or mostly to studies in school-aged children in developing countries mainly aimed to assess hearing impairment (**Figure 2**) ⁵⁻⁷.

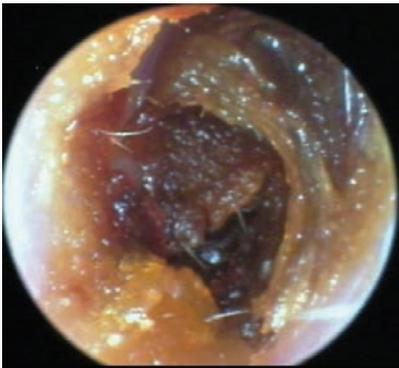


Figure 2. Example of impacted cerumen.

Cerumen is a normal secretion of sebaceous and ceruminous glands together with exfoliated epithelium the external ear canal. An accumulation or impaction of cerumen can cause hearing impairment or a reduce visibility of the tympanic membrane (**Figure 1**) ¹⁻³.

There is an extensive literature on the prevalence of impacted cerumen regarding adults and elderly with a prevalence ranging from to about 2% in normal adults to 40% of elderly people living in nursing homes ⁴.

In fact the prevalence of impacted or obstructing cerumen in children living in industrialized countries has been largely neglected in recent years.

As regard the diagnosis of otitis media, which needs the visualization of the eardrum, the consideration given to cerumen has varied considerably over time. While there are reviews and studies dealing with the diagnosis of AOM which are extremely detailed in the description of the tympanic membrane signs of acute otitis media but do not mention cerumen *at al* ⁸⁻¹¹ or dedicate just a few words ^{12,13}, others deal more with the

presence of cerumen but are not precise concerning the amount of cerumen which should not be present in order to adequately visualize the tympanic membrane, thus referring to the need to avoid partial occlusion ¹⁴ or to “cerumen which obscures the tympanic membrane” ¹⁵. On the contrary, recent guidelines and reviews focus on the need of removing all or nearly all the cerumen from the ear canal ¹⁶⁻¹⁸.

The long lasting lack of interest in the role of cerumen in children may be explained considering that some studies reported that removing cerumen is not necessary to correctly diagnose AOM and that only a small percentage of children are affected by this problem. In 1983 Schwartz assessed the consistency and appearance of cerumen in children with unilateral acute otitis media and found that only in 29% the removal was necessary to correctly visualize the tympanic membrane¹⁹. In 1985 Fairey found that about a quarter of children aged 3 to 10 years had appreciable amounts of cerumen but that the amount of earwax decreased when otitis media was present, therefore not supporting the need for removing cerumen when assessing children's ears²⁰.

Data regarding the attitudes of paediatricians and otorhinolaryngologists toward cerumen are very limited but they could be useful in planning educational programs²¹.

This study was aimed to assess the prevalence of cerumen in a large population of healthy and sick infants and children and to compare the cerumen removal attitudes by pediatricians (PEDs) and otorhinolaryngologists (ENTs).

Patients and methods

Children were examined in two consecutive weeks in October 2014 (from 10 to 25) in one Pediatric Emergency Department, in two primary care pediatrician offices and in 2 pediatric outpatient clinics in public hospitals.

Each child was included only one in this study and data regarding age, sex, race, diagnosis and location were recorded in a specially prepared recording card. At enrollment an otoscopic examination was done in both ears. The removal of cerumen during the healthy or sick visits was recorded.

The study was approved by the Institutional review board. Informed consent was obtained from the patients or parents.

The presence of earwax was graded according to the proportion of obstruction of the diameter of ear canal as follows: 0% (no cerumen); peripheral (cerumen lining the ear canal in a circular way, narrowing the lumen of the ear canal without impeding the visualization of the tympanic membrane); 25% (obstruction up to one quarter or the ear canal, which means that 75% of it could be visualized); 50% (obstruction up to half of the ear canal); 75% (obstruction of three quarters of the ear canal) and 100% (complete obstruction).

Before the beginning of the survey, PEDs and ENTs agreed on the grading of cerumen and on the graphic reported in the card (**Figure 3**). In addition, they participated in a session in which 30 ear photographs were shown and agreed on the amount of cerumen present.

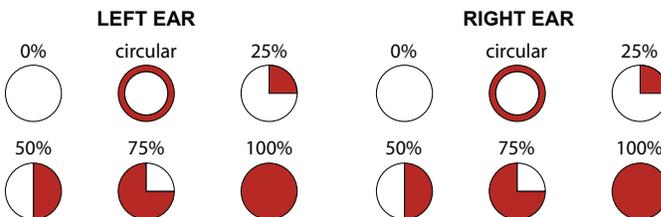


Figure 3. Grading of obstructing cerumen

Results

819 children were enrolled. They were seen by 667 pediatricians and by 152 ENTs. Cerumen was clearly visible in 594 (72.5%) of the children, and in most cases (487/594, 80.5%) was bilateral. The presence decreased significantly with age, was more prevalent in Asiatic children, in those with a diagnosis of acute otitis media and in children seen in outpatient clinics in hospitals (Figures 4 and 5).

More than 40% of the children had at least 50% cerumen in the worst ear, with a peak in children aged 37 to 72 months (52.2%) (Figure 6).

There was no significant difference as regards gender. African and Asian children were more prone to have cerumen obstructing more than 50% of the ear canal compared to Hispanic or Caucasians children. More than 50% of the children diagnoses as having acute otitis media presented with cerumen obstructing more than 50% of the ear canal in the worst ear.

As regards removal according to specialty and diagnosis, ir-respectively of the amount of cerumen, age, gender, race, reason for visit and location, pediatrician tried removed cerumen in a very low proportion of cases, and always significantly less than ENTs (Figure 4) (Figure 7).

One hundred ninety-nine children were diagnosed as having bilateral acute otitis media. Of these 96 (48.2%) had a modest accumulation cerumen (circular to 25%) while 103 (51.8%) had an accumulation of more than 50% of the ear canal. In both group pediatricians removed cerumen significantly less frequently than ENTs (circular to 25%: PEDS 6.8% vs ENTs 43.2%, $p < 0.001$; at least 50%: PEDs 31.6% vs ENTs 95.6%, $p < 0.001$).

Discussion

Our study, which, to our knowledge, is the largest study reporting the prevalence of cerumen

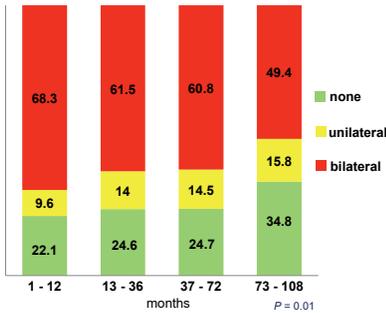


Figure 4. Presence of cerumen according age

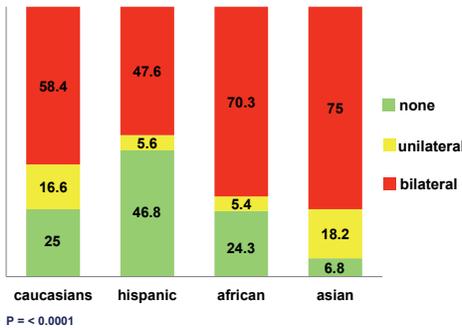


Figure 5. Presence of cerumen according to ethnicity

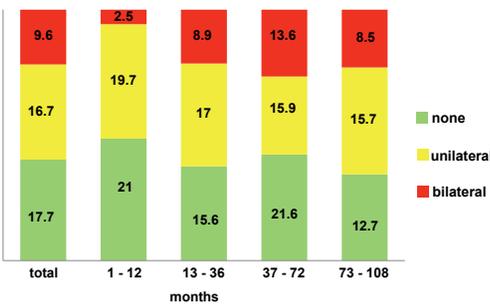


Figure 6. Proportions of children with at least 50% obstructing cerumen according to age

in children in a developed country and the first one to include circular cerumen in the grading of obstruction, shows that cerumen is highly prevalent both in healthy and in sick children.

The presence of visible cerumen decreased with age, with a clear trend from the youngest to older children. About 40% of the children (at any age) have cerumen obstructing more than 50% of the ear canal. We decided

to be very detailed in assessing the amount of cerumen and not to use definitions which may be confusing and not consistent among studies. This finding is only partly in agreement with the data of Schwartz¹⁹ because of the different age groups stratifications, as we privileged a stratification according to school attendance. The study of Macknin²², which reports that 7% of both right and left ear canals were at least 75% occluded by cerumen, takes into account only children aged 2 weeks to 20 years, with a median of 4,5 years and does not stratify cerumen accumulation according to age. Moreover, none of the previous studies report the percentage of children with completely obstructing cerumen.

Cerumen impaction is usually defined as an accumulation of cerumen that causes symptoms, prevents a needed assessment of the ear canal/tympanic membrane or both². However, we think that this broad definition is misleading. As concerns hearing impairment an accumulation of cerumen obstructing 75% of the ear canal would be adequate. On the contrary, in agreement with the latest guidelines on the diagnosis of acute otitis media, even an obstruction of 25% might impair an accurate visualization of the tympanic membrane and therefore cause a misdiagnosis of acute otitis media.

Interestingly, in our study a relevant proportion of children (about 70%) in whom a diagnosis of AOM was made by PEDs had cerumen obstructing more than 50% of the ear canal but no attempt of removal was performed. On the contrary, ENTs were always prone to remove cerumen, independently from the grading of obstruction. These data suggest that the risk of an incorrect diagnosis of otitis media is remarkably high if made by PEDs not willing to fully visualize the tympanic membrane.

Our study has some limitations. This is not a cohort study and thus it can be considered the natural course of cerumen in pediatrics. We did not perform audiograms in these children and thus we do not know if children with unilateral versus bilateral impacted cerumen had worse hearing. But the study was not designed to study this and, in addition, there are already several studies which assess the hearing level of cerumen.

Conclusion

In conclusion, we think that cerumen is a neglected but fundamental problem in children. Education programs to reinforce the importance of cerumen and to improve that techniques for removal in case of suspected acute otitis media should be implemented and rigorously evaluated.

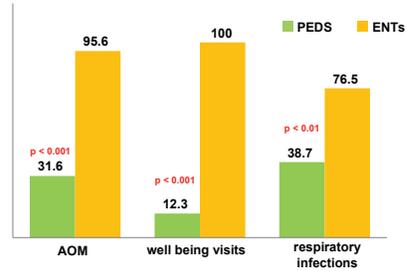


Figure 7. Removal of cerumen according to specialty and reason for visit.

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