Otitis media with effusion: expectant management

Moacyr Saffer,1 Daniela B. da Silva,2 Fernanda D. Peduzzi,2 Fernanda Ávila4

Abstract

Objective: despite the high prevalence of chronic otitis media with effusion (OME) in children, the real effectiveness of most treatments in use nowadays has not been completely established. Based on the natural course of this disease, we support expectant management as the initial treatment strategy.

Methods: we carried out a review of the literature taking into consideration the natural history, epidemiology, and therapeutic options for OME with the aim of identifying a consensus concerning the best treatment for OME in children.

Results: the treatment of OME remains controversial, despite the several alternatives. In children, the best option still seems to be observation for three to six months. However, interventional treatment should be started earlier in high risk patients with tympanic/ossicular alterations or impaired development resulting from hearing loss secondary to OME.

Conclusions: the several factors involved in the pathogenesis of OME, as well as the characteristics of the evolution of this disease support the strategy of expectant management until clinical or surgical intervention can no longer be postponed.


Introduction

Otitis media with effusion (OME) is defined as an inflammation of the middle ear mucosa along with an accumulation of liquid without signs or symptoms of acute infection.1 A consensus document issued in 1994 during the US Agency for Health Care Policy and Research (AHCPR) Conference, endorsed by the American Academy of Pediatrics, American Academy of Family Medicine, and American Academy of Otorhinolaryngology and Head and Neck Surgery,2 defined the criteria for diagnosing OME in small children. The document refers to children aged 1 to 3 years who present fluid in the middle ear 6 weeks after an acute episode of otitis media AOM), without signs of acute infection and without another underlying medical condition.2

Clinical diagnosis is performed through otoscopy with visualization of the fluid, which may present characteristics of plasma exudation or of mucus secreted by mucus secreting cells. In the first case, the tympanic membrane remains transudic, and the presence of blisters or the level of liquid may be verified, in addition to the degree of retraction. In
the second case there is loss of translucency in the tympanum, with frequent increase of its radial vascularization. Tympanometry is an excellent diagnostic test, with 85% of specificity in cases of middle ear secretion, in which it shows increased impedance in the propagation of sound by the tympanic-ossicular complex, measured and recorded in a tympanogram. Jerger, in 1980, developed a classification of tympanograms according to which normal compliance is represented by tympanogram type A, and reduced compliance (flat curve) by type B, which is associated with the presence of effusion in the middle ear. The presence of perforations, cerumen, or other abnormalities is ascertained through otoscopy.

The etiology of OME has not been completely established yet, but evidence indicates that OME occurs due to the persistence of fluid in the middle ear after an episode of AOM, or that it is related to auditory tube dysfunction, with or without the presence of infection in the upper airways. OME affects a high number of children, and it accounts for a large proportion of the surgeries in 1 to 7 year old patients. Its social impact is evident, since it is recognized as a cause of language and learning impairments. A reduced ability in detecting objective sounds in noisy environments has been reported in older children who once had OME. Some factors may predispose to OME, such as age, sex, race, season of the year, breastfeeding, smoking parents, and time spent in nurseries and day care centers. Home smoking is the most important avoidable cause, a fact that should encourage parents to quit smoking. Some children may be considered at high risk for the development of OME, such as those who present structural flaws in the tympanic membrane or in the auditory tube, such as children with cleft palate, Down Syndrome, Treacher-Collins syndrome, or other cranio-facial deformities.

The natural history of OME has given rise to doubts concerning the best treatment among the scientific community worldwide. The evolution of a disease is defined in terms of its duration, rate of recurrence, and rate of recovery. Since OME is frequently resolved spontaneously, one of the clinical options is to simply allow the disease to follow its own course, giving priority to periodical controls. Bernstein emphasizes that the maturation of the auditory tube in children, combined with the resolution of local inflammatory response improves most cases of OME. While little that can be done to accelerate the development of the tube, inflammation and edema on the mucosa may be reduced by limiting concomitant passive smoking, controlling allergy and sinusitis, reducing the number of upper respiratory tract infections, and by encouraging breastfeeding, in addition to finding alternatives to day care centers with a large number of children.

Expectant management is justified by a series of observations based on well conducted clinical works, in which most OME cases resolved spontaneously without any intervention by the physician. Approximately 65% of OME cases resolve spontaneously, without the need for antibiotics; 90% of OME cases diagnosed soon after an acute episode of otitis media resolve spontaneously within three months.

In 1972, in a cohort study, Fiellau-Nikolajsen reported a high rate of spontaneous cure and normalization of ears with OME and tympanogram type B in 3 year-old children. From 94 ears with OME, 33 remained affected after 3 months of follow-up, and only 19 after 6 months. Girls improved faster than boys.

In a prospective study with monthly tympanometries performed in 387 7 year-old children, Tos showed that in approximately one fourth of these children, the tympanograms were repeatedly altered in consecutive monthly tests. In 17%, this examination showed different results in 5 or more measurements during their first year in school. The same investigators observed spontaneous improvement in 90% of the cases and normalization in 76% of the cases of otitis media with effusion during the period of observation (1 year). An observational study was performed with 1,439 children screened by tympanometry in order to detect the presence of OME; the study began when they were about 2 years old and continued up to their fourth birthday. The results show that two thirds of all OME episodes lasted less than 3 months; less than 10% showed persistent type B tympanogram (flat curve, without compliance) for more than 9 months. The rate of recovery was around 60% after 3 months and 85% after 6 months. On the other hand, the recurrence rate was also high: A two-year follow-up revealed that 65% presented a second episode of OME. It is interesting to note that more than 10% of the cases showed a frequent pattern of recurrence. In those cases, type B tympanograms were recorded at short intervals. This observation decreases the prognostic value of the tympanogram to predict the course of OME. In addition, it does not support indication for treatment in asymptomatic children submitted to one evaluation only.

These results are in agreement with those of several other works. Fiellau-Nikolajsen showed that spontaneous remission of OME is less probable when it does not occur within the first 3 months of appearance of the disease; after this period, an intervention might be necessary. However, even after this time, there is still the possibility of spontaneous cure in approximately 50% of the cases.

In the natural history of OME, the recurrence rate is elevated. The mean duration of episodes is highly variable; some authors observe a mean duration of 5 weeks in patients with only one ear affected, and 6 to 10 weeks in patients with bilateral involvement. However, a longer duration, from 4 to 6 months, was observed in 3 year-old children, justifying expectant management for periods ranging from 3 to 6 months in asymptomatic children. Active and periodical observation of those special cases, in high risk children and in the presence of hearing loss, is mandatory. In these cases, intervention must occur early, due to the risk for learning
and language delays. The AHCPR consensus recommends drug treatment or surgical intervention in patients with bilateral effusion existing for 3 months, especially if accompanied by significant bilateral hearing loss.²

Nikolajsen observed that OME affects children in several ways: about 15% have an isolated episode or short episodes lasting from 1 to 3 months; approximately 25% have repeated short episodes; 15% have one or more long episodes lasting from 3 to 9 months; 15% have repeated long episodes, and finally 10% have extremely long episodes, lasting for 1 or more years.³¹ These differences in the behavior of the disease show that some factors may be related with a longer episode duration and more frequent relapse, such as the permanence in day care centers or institutions, atopy, belonging to the male sex, and genetic factors.¹⁰ The period of the year in which the study was performed may have also interfered with the results; this emphasizes the need for longer studies, taking into consideration more than one observation. During winter months the number of children with alterations in the tympanic membrane was shown to be significantly higher if compared to the summer.³ This strengthens the hypothesis that seasonality also interferes with OME behavior. The presence of fluid in the middle ear is intimately associated with the presence of upper respiratory tract infection: about 35% of the children with upper respiratory tract infection presented concomitant otitis media with effusion, while only 11% of the patients without upper respiratory tract infection had OME.³²

Studies in which fluid for culture was collected from the middle ear of OME patients have not observed bacterial growth. However, a great number of leukocytes was found, corroborating the idea of inflammatory etiology in most of the patients.³³,³⁴

Recent studies show a hiatus concerning OME treatment: when should interventional treatment be used (antibiotic therapy, myringotomies, ventilation tubes)? The use of antibiotics in asymptomatic patients is controversial; one study showed that only one in seven children treated with antibiotics benefited from this treatment.³⁵ A meta-analysis evidenced that there was no significant difference between antibiotics or placebo in terms of OME incidence 1 month after the treatment.³⁶ The increase of 15% in the resolution of the disease attributed to the use of antimicrobials must be seen as a short term benefit, since the long term impact is still smaller, if not neglectful. The small benefit of antimicrobial therapy in OME leads to the question of whether this treatment should be offered at all.³⁷ After an AOM episode, the fluid inside the middle ear may persist for up to 2 weeks in 70% of the children, for 1 month in 50%, for 2 months in 20%, and for up to 3 months in 10% of the cases, despite the antimicrobial therapy adequate for OME.³⁸-⁴⁰ Thus, an important step in reducing the unnecessary use of antibiotics in those cases is the recognition that the temporary effusion in the middle ear of children may be an expected part of the course of acute otitis media.⁴¹

The AHCPR consensus revealed that there are two rather similar options in the long term management of OME patients: one with the use of antimicrobials, and another without its use.² Evidence showing that the use of antibiotics...
increases the risk for colonization by penicillin-resistant Streptococcus pneumoniae support simple observation as the best option.41

There is evidence showing that the prevalence of penicillin-resistant Streptococcus pneumoniae is higher among children recently treated with beta-lactam agents and also in those who attend day care centers.42 Several varieties of penicillin-resistant Pneumococci are also resistant to other antimicrobials, including macrolides and cephalosporins.42 The emergence of multiresisting microorganisms has already become a problem for physicians working in emergency services, since they frequently encounter serious infections, such as pneumonias, which do not respond to the usual treatment.43 It is important to stress that the excessive use of antibiotics does not cause resistance at an individual level only; rather, the transmission of resisting pathogens is a real public health problem. The use of antimicrobials must be carefully considered only in patients with recurrent acute otitis media associated with OME, or when there is a contraindication to the surgical procedure.4

Regarding surgical treatment, the placement of ventilation tubes is beneficial for patients with bilateral hearing loss resulting from OME,5 considering the natural history of the disease, the risks of bacterial resistance, the proven benefits, and the simple placement technique. Ventilation tubes are indicated whenever OME, closely followed from 3 to 6 months, presents an unfavorable evolution in low risk children. It is important to keep in mind that surgery alone does not solve the problem, since the resolution of OME is based on the adequate development of the child’s auditory tube and of immune system.12

Auto-insufflation is an attractive and old method used for pumping air into the ear, which is still used in an attempt to balance negative pressure and treat OME. The evidence concerning the use of auto-insufflation as a treatment for OME in children is controversial.44-48 Insufflation is carried out using the Valsalva maneuver, the Politzer apparatus, or with balloons of various shapes.48 The technique is based on the already abandoned theory of hydrops ex vacuo. Historically, this notion originates in a perception of nature dating from 2,500 years ago (Alcmaeon, 6th century BC), the so-called aer implantatus. According to a modern concept, when pressure is balanced by insufflation, in a middle ear cavity with a negative pressure of -400 mmHg PO2 will increase 4.5 mmHg and PCO2 will decrease 1.8 mmHg. These differences in partial pressure may provoke a bidirectional diffusion of O2 from the middle ear into venous blood and of CO2 from venous blood into the cavity. This happens due to differences in gas partial pressures, in the degree of diffusion between the gases or due to the pathologic status of the mucosa.49 In sum, there will be a diffusion of gases from the middle ear into venous blood. This will accelerate the degree of physiologic absorption of the gas, leading to a negative intratympanic pressure.50,51

The normal composition of gases in the middle ear is in equilibrium with the local venous circulation in relation to O2 and CO2, whereas N2 has a difference of 50mm Hg.52 Basic respiratory physiology in auto-insufflation, as currently proposed, opposes the affirmation that it is an effective treatment for children with OME. We understand that one simple or three repeated auto-insufflation maneuvers in 1 day do not have a long term effect on middle ear negative pressure. It is possible that the combination of multiple daily insufflations and the use of gases with low diffusion or combinations of these might be useful and should be assessed in future studies.

Conclusion

We support the adoption of expectant management in asymptomatic children for a period of up to 6 months. This recommendation is based on well-documented observations on the spontaneous regression of OME and takes into consideration present and future aspects of bacterial resistance, which warrants the careful use of antibiotics only in situations of AOM. In addition, periodical follow-up, efforts to prevent smoking, and the education of parents regarding the prevalence and the natural course of the disease will guarantee the adequate control in this period. Due to the changing character of this entity, the aim of periodical follow-ups should be to diagnose those children who really have OME, separating them from those with short duration residual fluid, such as that resulting from infections in the upper airways and AOM. We emphasize that such measures are indicated before opting for surgical treatment in children who present fluid in the middle ear. Expectant management does not mean “not doing anything”, but rather establishing a correct diagnosis, performed through active observation.

We stress that common sense is the basic rule in special cases presenting learning impairments or risk for otologic complications, such as children with cleft palate, structural defects of the tympanic membrane, autism, attention deficit, speech or language delays, psychomotor, sensorial, cognitive, or intellectual delays, and concomitant neurosensorial hearing loss. Surgical drainage with the placement of a ventilation tube is the alternative in both high risk children (carried out earlier than in asymptomatic children) and low risk children in whom expectant management was no sufficient to resolve OME. This surgical intervention aims at avoiding both irreversible lesions of the tympanic membrane and complications related to hearing loss, quickly restoring normal hearing. Finally, it is important to stress that the surgical alternative should only be adopted after rigorous observation of the principles described above.
References


Correspondence:
Dr. Moacyr Saffer
Rua Mostardeiro, 333 - conj. 714
CEP 90430-001 – Porto Alegre, RS, Brazil
Phone: +55 51 3222.9844