

Acute Otitis Media

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Aspects of infection and allergy

A O M M

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Introduction

For the clinical diagnosis of acute otitis media it is necessary to make clear how the diagnosis is made.

Cochrane reviews of the subject are considered of great interest due to the evidence based approach as in our earlier review and protocol (Pedersen M (2000) and Hopkins C (2004).

The evidence based studies referred to in the Cochrane Library are also of special interest.

Decisions for antibiotic treatment should be based on a scientific based scheme. This is also the case for prophylaxis and predictive values, where the scientific problems still have to be solved and evidence should be elucidated further in the future. Last but for the future the ethiology not least is of major interest.

Material and Methods

-DIAGNOSIS

The read and eventually swollen drum at best seen with the microscope (mostly not used in clinical trials), pain in the ear and fever are the basis for the diagnosis. Effusion comes and goes within hours.

A **prediction** of etiology of bacteria, virus, allergy, nasal obstruction and other provocations of e.g. surroundings should be made.

An examination for virus and bacteria in the rhino pharynx should be made: seen are respiratory syncytial virus, influenza A virus and other virus, among the bacteria streptococcus pneumonia, h emophilus influenza, moraxella catharralis, streptococcus type A ,C and G, staphylococcus and other bacteria's.

The temperature should be measured.

Reasons should be explored: carriers, colds, etc., immune system parameters involved should be elucidated, and in suspicious cases screening should be made for allergy with blood test of child allergy and inhalation allergy. If blood tests cannot be carried out, prick test show the same defiance. Provocations from the surroundings can be involved (e.g. typically a young family has just moved into a new cold house with a lot of dust and painting).

-COCHRANE REVIEWS RELATED TO ACUTE OTITIS MEDIA

Six Cochrane reviews related to acute otitis media were found

Kozyrskyj 2000

Kozyrskyj AL, Hildes-Ripstein GE, Longstaffe SEA, Wincott JL, Sitar DS, Klassen TP, Moffat MEK discussed short course antibiotics for acute otitis media and concluded that five days of short-acting antibiotics is effective treatment of uncomplicated ear infections.

Glasziou 2004

Glasziou PP, Del Mar CB, Sanders SL, Hayem M, show that antibiotics provide a small benefit for acute otitis media in children. As most cases will resolve spontaneously, this benefit must be weightened against the possible adverse reactions. Antibiotic treatment may play an important role in reducing the risk of mastoiditis in populations where it is more common.

Butler 2002

Butler CC, van der Voort JH, discussed the problem of oral or topical steroids for hearing loss associated with otitis media with effusion in children and concluded, that both oral and intranasal steroids alone or in combination with an antibiotic lead to a quicker resolution of acute otitis media in the short term.

However there is no evidence of a long term benefit from treating acute otitis media effusions or associated hearing loss with either oral or topical intranasal steroid. No serious adverse events were reported in the six studies that presented data on adverse effects.

Future studies should document hearing loss associated with acute otitis media before the start of study treatment.

Follow up should be longer and ideally include health related quality of life and hearing assessments. Data should not be presented only with ears as the unit of analysis.

Butler 2003

Butler CC, van der Linden MK, MacMillan H, van der Wouden JC, in their review of evaluation of evidence based research on screening children in the first four years of life to undergo early treatment for otitis media with effusion **conclude:** the identified randomised trials do not show an important benefit from screening of the general population of asymptomatic children in the first four years of life for otitis media with effusion on language development and behaviour.

Flynn 2004

Flynn CA, Griffin GH, Schultz JK, concluded that given lack of benefit and increased risk of side effects, these data do not support the use of decongestants treatment in children with acute otitis media.

There was only a small statistical benefit from combination medication use but the clinical significance is minimal and study design may be biasing the results. Thus, the routine use of antihistamines for treating of acute otitis media in children cannot be recommended.

Lous 2004

Lous J, Burton MJ, Felding JU, Ovesen T, Rovers MM, Williamson I, discussed grommets (ventilation tubes) for hearing loss associated with otitis media with effusion in children. They concluded several points, but the benefits of grommets in children appear small, even if the short term effect is perceived dramatic by the parents.

The generally modest results in the trials which are included in this review should make it easier to justify randomisation of more severely affected and higher- risk children in appropriately constructed trials.

Randomised controlled trials are necessary in these children before more detailed conclusions about the effectiveness of grommets can be drawn.

Two protocols for later reviews have been made.

Leach A, Morris P, Castano R, on Antibiotics for the prevention of acute otitis media in children

Williamson I, Del Mar C, Crosby Z , Little P on Immuno stimulating agents for the prevention of acute otitis media

Referring to the reviews: antibiotics do have effect on acute otitis media, local steroids plus antihistamines (together) do have some effect (studies insufficient, further evaluation of immune stimulating agents), prophylactic antibiotic treatment has to be evaluated.

The indication for ventilations tubes is modest and focus is made on higher risk children before

more detailed conclusions can be made

-EVIDENCE BASED STUDIES IN THE COCHRANE LIBRARY AND OTHER IMPORTANT STUDIES

We found 65 evidence based studies including reviews and protocols in the Cochrane Library, and many others in all 866 studies were found.

-An evaluation of the studies for clinical application includes the fact that 93% of children in the US had at least one episode of acute otitis media with a cost of 14 billion dollars p-year (AHRQ Evidence reports and summaries on Acute otitis Media, National Institute of Health, 2005).

-Eight research conferences on recent advances in otitis media have been made, in the latest a discussion was made of microbiology and immunology.

It was shown that the middle ear mucosa is similar to that of the rest of the upper respiratory tract and in itself capable of an allergic response (Barenkamp SJ et al. 2005)

It has been shown in the evidence based studies, that in relation to acute otitis media, prophylaxis, and supplementary treatment:

- **budesonide** has effect, fluticazon has no effect, in both studies better design of studies is suggested -antihistamine has effect when there is a supplementary allergy
- **otitis prone children** failed to develop a broad protection antibody response
- **adenoidectomy** has no effect
- **vaccination** (influenza A, pneumococci) are questioned

additional factors:

- **bilateral nasal obstruction** due to upper airway infection may produce profound negative pressure in the middle ear
- **intoxication**, dry surroundings with dust and other provations are related
- food (**allergy**, intolerance) has a basic influence.
- **viral upper respiratory tract infections** should now a days be detected (PCR for Infuenza A and respiratory syncytial virus, eventually also adenovirus and others)
- **the various bacteria** have different destruction capabilities in the mucosa and should be detected

Results

-ANTIBIOTIC TREATMENT OF ACUTE OTITIS MEDIA

antibiotics are given when a bacterial background is expected.

A swab for virus and bacteria is made before the antibiotic is given
analysis is made for the referred viruses and bacteria.

Standard treatment “on the spot” is +/- antibiotics
- antibiotics if the general condition is good
+ antibiotics if the general condition is bad

which antibiotic should be used

In an advanced ear-nose throat clinical service it is expected that there is knowledge of the different bacteria and viruses, and how they attack the mucosa differently. This knowledge is related to the speciality of ear-nose-throat disorders, and an advice from a microbiologist or allergologist will in many cases not cover neither solve the problem. (Caye-Thomassen P, Tos M 2000).

Still, apart from cases of allergy to penicillin the choice between amoxicillin/clavulanate and azithromycin is dependent on which bacteria is predicted, and the supplementary additional treatment depends on predicted (suspected) virus (Block SL et al. 2003, Butler CC et al 2005).

Better designed study designs are necessary.

Comparison between retrospective and evidence based studies is difficult for many reasons, the inclusion criteria playing a major role (comment letter 1 by Hoberman A, Paradise JL and 2 by Jacobs MR, Dagan R, Singer ME 2004).

-FIRST CHOICE OF ANTIBIOTIC FOR TREATMENT

(before microbiological answers have been given)

-narrow band penicillin is given for slight infections in sufficient doses for a sufficient time (e.g. till 2 days without symptoms)

-broad spectrum penicillin at best with clavulanic acid is given in all other cases where penicillin is expected to have an effect (e.g. moraxella and haemophilus)

-azithromycin is given where penicillin is contraindicated or not expected to have effect (penicillin allergy, staphylococci etc).

The swab results are decisive for further treatment

-ADDITIONAL TREATMENTS ARE ALWAYS RECOMMENDED

with local supplements of the normal hormones stabilising the immune system because of the documented alertness of the immune system due to virus and bacteria as well

- steroid nasal drops or spray in the nose (in relevant doses, not too low)
- adrenalin derivates as universal or local treatment in the nose (in relevant doses, not too high)
- antihistamine treatment as universal or local treatment in the nose (in relevant doses, not too low)

-PROPHYLAXIS FOR RECURRENCE

Includes

- sufficient local treatment with steroids and antihistamines of the damaged mucosa till stability has been reached (visual scores could be established as in other fields)
- sufficient supplementary antibiotic and other treatment, if the virus or bacteria were not sufficiently treated in the first place, documented with the results of the swabs results from the microbiologist.
- sufficient diagnosis and evaluation of relevant immunological aspects

based on

- blood tests of the patient (traditional inhalation test, of pollen, animal hair, dust, and child food allergy screening)
 - history of the family including atopy and stomach problems, and the surroundings
- In otitis prone patients
- in some families immunological deficiencies are the reasons for acute otitis media (Nielsen RG, Bindslev - Jensen S, Kruse-Andersen S, Husby S, 2004) and Kaats GR, Pullin D, Parker LK 1996)
 - genes are related, genetic studies of asthma have been made (Håkonarson H 2005)

-ETHIOLOGY

There are ethiology aspects for the understanding of why children get acute otitis media.

There is a growing understanding of

- differences of immune systems that include different diets
- difference of surroundings that include dust provocation and others
- difference of time aspects, including efficient prophylaxis EXACTLY when symptoms begin
- differences of weaknesses of immune system defence, with genetic aspects

Therefore it is necessary to point out that

-evidence based good randomised clinical studies with statistically relevant control groups and follow-up on the aspects of acute otitis media have not yet been finished

-the hope is that the articles and reviews, studied, can be used as a basis for a later prospective randomised multi center protocol for an evidence based diagnosis, treatment and follow-up for acute otitis media, based on life style evaluation including diet, with secure statistical differences between groups which is mostly not found.

CONCLUSION

Acute otitis media can be looked upon as a normal developmental phenomenon in children, because of the well known introduction to bacteria, virus and food at the early age of children.

And so is dysfunction of the Eustachian tube looked upon.

Acute otitis media in adults can be looked upon as a result of a deficiency of the immune system and provocation from the surroundings.

Differences for children and adults can also be related to life style including food provocations, pollution and genetically related aspects (e.g. a specific genetic diet is optimal for each person).

The understanding of timing of the right treatment e.g. of AOM at the right time goes back to Einstein, and still seems not to be accepted by the majority of politicians involved in health care.

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