

REVISITING ANTIMICROBIAL THERAPY IN ACUTE OTITIS MEDIA IN CHILDREN

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Abstract

A middle ear infection is referred to as acute otitis media (AOM). [1] It is the second most common cause of visit to family physician among the pediatric population, following upper respiratory infections. OM has caused a significant burden on the health system, the economy, and the patient's quality of Life. The overall incidence of complications due to OM is extremely low, infratemporal and intracranial complications occur in one in 100,000 children yearly. Routine initial administration of antibiotics should be avoided, as most children experience spontaneous resolution in one to two weeks. Oral antibiotics are indicated to treat OM with bacterial etiology: high-dose amoxicillin or amoxicillin-clavulonic acid is the first choice of antibiotics in children who are not allergic to penicillin. Most efficacy studies have set the duration as 7-10 days. Longer duration is needed for a child less than 6 months with severe disease.

INTRODUCTION

Acute otitis media (AOM) is described as an infection of the middle ear space. In children, it is next to upper respiratory illnesses in terms of the reasons for family doctor visits. [2] Otitis media can develop at any age, but between the ages of 6 and 24 months, it is most common. In their lifetime, about 80% of kids will have otitis media, and before they start school, between 80% and 90% of kids will have otitis media with an effusion. Despite a reduction in otitis instances as a result of baby pneumococcal vaccination, by the age of one, about 23% of kids have had more than one episode of otitis media, by the age of three, 60% have had more than twenty episodes, and by the age of four, 24% have had more than three episodes. [2]

The Disease Burden: Global and Indian scenario

Otitis media (OM) is a spectrum of diseases, including acute OM, OM with effusion, and chronic suppurative OM; In the emergency room, acute OM is the second most frequent pediatric diagnosis. [3] Children are predisposed to acute OM since they acquire viral infections more frequently as compared to adults, and they also have shorter, more horizontal eustachian tubes than adults. [4]

OM has caused a significant burden on the health system, the economy, and the patient's quality of Life. [5,6] OM has the highest global incidence in the age group of 1-4 years and accounts for over one third of pediatrician visits. [5] The global cumulative OM incidence rate is 10.85% (709 million cases yearly), 51% of which affect children under the age of five. [6] India is associated with a high prevalence of OM, ranging from 4.55% to 25.78%. [5] Evidence shows that children of low socioeconomic status are at high risk of OM as they lack breastfeeding, live in overcrowded areas with poor hygiene, and are exposed to pathogenic microorganisms, passive smoking, low nutrition, and healthcare. [5]

Bacterial etiology in OM

Environmental factors, immunological deficiencies, gender, age, and microbial exposure are among the many factors that contribute to OM. [7] Bacterial and viral pathogens are infectious factors that contribute to OM; only 4% of children who are diagnosed with OM are pathogen-free. [7] Between 35% and 55% of OM cases are caused by bacterial infections. [4] Because OM is a multi-microbial illness, strains of bacteria, as well as *Moraxella catarrhalis*, *Haemophilus influenzae*, and *Streptococcus pneumoniae*, *S. pyogenes*, *Staphylococcus aureus*, *viridians streptococci*, and *Pseudomonas aeruginosa*, were isolated More than 50% of OM was caused by the gram-positive bacterium *S. pneumoniae*, which was also the most frequent cause of AOM across

all age categories. Following *S. pneumoniae*, non-typable *H. influenzae*, which produced β -lactamases in about 50% of cases, caused around 20% of OM episodes in children under the age of six, and *M. catarrhalis*, which had a prevalence rate of 10%–15%..[6]. The most frequent viral infections associated with otitis media include respiratory syncytial virus (RS), coronavirus, influenza virus, adenoviruses, human metapneumovirus, and picorna viruses.[1]

Clinical Features of OM:

A change in sleeping or eating patterns, irritability, or occasionally holding or tugging at the ear may be signs of ear pain. Additionally, a fever may exist and, on rare occasions, be the only symptom. AOM symptoms might vary, particularly in newborns and young children.

Examination of Tympanic membrane,

Otoscopy is the gold standard for diagnosis of OM. Young children's ear examinations are rather invasive procedures that frequently encounter the patient's lack of cooperation, and hence challenging to the physicians. Understanding how to perform pneumatic otoscopy is an essential ability for evaluating a child's ear and correctly diagnosing AOM.

Diagnosis : A diagnosis of AOM according to the 2013 American Academy of

Pediatrics guidelines should be made in children who exhibit with:

- moderate to severe TM bulging or newly developed otorrhea that isn't brought on by otitis externa
- minor TM bulging, recent (within 48 hours) development of ear discomfort, or severe TM erythema



Fig.1 Examples of normal tympanic membrane (A) and of mild bulging (B), moderate bulging (C), and severe bulging (D) of the tympanic membrane from middle-ear effusion. (Courtesy of Alejandro Hoberman, MD.)[8]



Fig. 2 Tympanic membrane in acute otitis media[8]

Complications of recurring OM

One in 100,000 children each year experience infratemporal and intracranial issues, which represent a very low overall incidence of OM complications.[9] Mastoiditis and intracranial complications, such as meningitis, and brain abscess, are common complications of acute OM. Recurring OM negatively affect language development and result in long-term speech problems; consequently, effective early treatment of recurrent acute OM is advised by international guidelines such as those of the American Academy of Pediatrics (AAP) and the American Academy of Otolaryngology-Head and Neck Surgery.[1]

Treating OM

OM treatment goals include symptom resolution and reduction of recurrence. Routine initial

1. administration of antibiotics should be avoided, as most children experience spontaneous resolution in one to two weeks. So, delaying antibiotic therapy can reduce costs, side effects, and the emergence of resistant strains.[9] Watchful waiting is another management strategy of OM practiced in various countries. However, oral antibiotics are indicated to treat OM with bacterial etiology.[1] Antibiotics are recommended for all infants aged below 6 months, infants between the ages of 6 and 24 months when the diagnosis is confirmed, and all children older than 2 years with severe infection. FIGURE 3

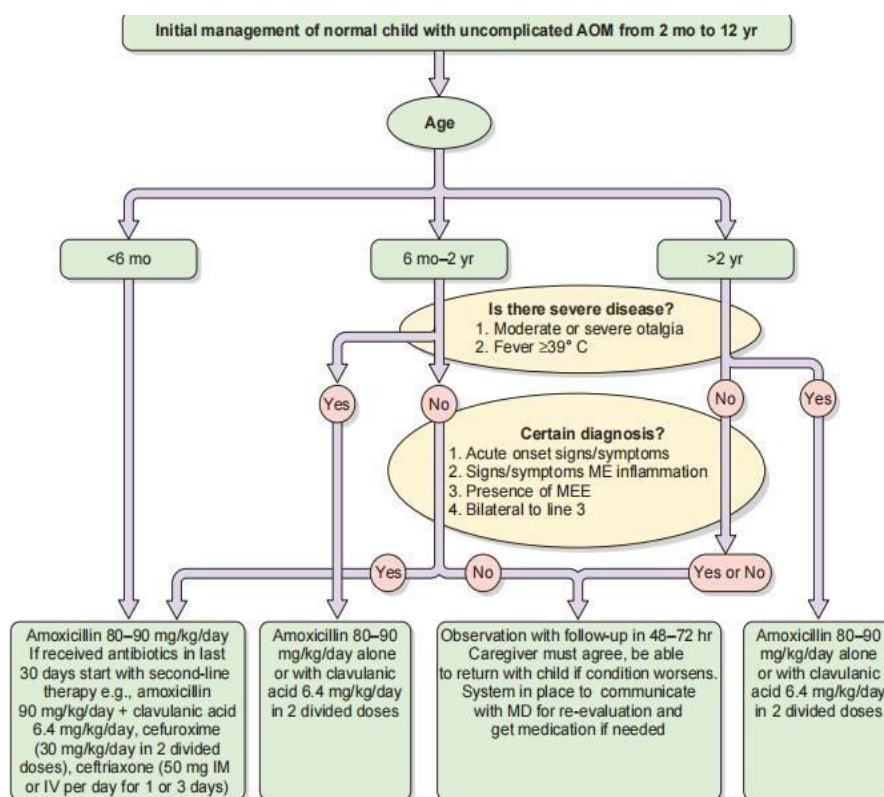


FIGURE 3. Algorithm for management of acute otitis media.[10]

INDICATIONS FOR ANTIBIOTIC THERAPY

- In very young patients less than 6 months of age, because of the greater likelihood of complications, antibiotics should be used even in suspected instances of AOM.
- Acute otitis media with otorrhea should always be treated with antibiotics at any age.
- In children aged 6 months and older with severe symptoms (i.e., moderate to severe otalgia or otalgia for at least 48 hours, or temperature of 39°C (102.2°F) or above), antibiotics should be begun for bilateral or unilateral AOM. Bilateral AOM

in children under 24 months old should be treated with antibiotics if there are no serious symptoms or indications (i.e., moderate otalgia lasting less than 48 hours and a temperature under 39 °C (102.2 °F)).

- Initial antibiotic therapy or initial observation with close follow-up for unilateral AOM in children 6-23 months of age without severe symptoms i.e. mild otalgia for less than 48 hours and temperature less than 39°C (102.2°F).
- In children 24 months or older with unilateral or bilateral AOM without severe signs or symptoms, either initial antibiotic therapy or initial observation with close follow-up should be offered.

SECOND LINE DRUGS :

Any second-line medications should be effective against *M. catarrhalis*, B-lactamase-producing nontypeable *H. influenza* strains, and nonsusceptible *S. pneumoniae* strains. Only four medications meet these requirements; they are ceftriaxone (50 mg/kg/day intramuscular (IM) or intravenous (IV) for 1-3 days) and cefdinir (14 mg/kg/day in two divided doses), cefuroxime (30 mg/kg/day in two divided doses), cefpodoxime (10 mg/kg/day in two divided doses), and cefuroxime (10 mg/kg/day in two divided doses).

DURATION OF TREATMENT

Most efficacy studies have set the duration as 7-10 days. Longer duration is needed for a child less than 6 months with severe disease, child with craniofacial anomalies.

Recurrent AOM is defined as having three episodes in a period of six months, or four episodes in a period of one year with a prior episode in the previous six months. A second-line medication should be used to treat the condition in those situation.

Summary

- OM is a poly microbial disease, and *S. Pneumoniae*, *H. influenza*, and *M. catarrhalis* are the most common OM-causing pathogens.
- Recurring OM can negatively affect children's language development; thus, aggressive early treatment is mandatory to manage recurrent acute OM.
- OM treatment goals include symptom resolution and reduction of recurrence; oral antibiotics such as amoxicillin-clavulonic acid is the first-line treatment choice for OM in children.
- Clavulonic acid, combined with amoxicillin, broadens its spectrum of activity and combats resistance to bacteria.
- Traditionally amoxicillin is used as drug of choice in management of OM, however addition of clavulonic acid and increasing the dose of amoxicillin to 90mg/kg/day to drug resistant *S. Pneumoniae* has been beneficial.

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