

Otitis Media Aguda en pediatría

Juan Carlos Salazar, M.D. MPH., Universidad de Connecticut, EE.UU.

Otitis media is one of the most common infectious diseases of childhood. In the United States, estimated office visits attributable to the treatment of acute otitis media (AOM) range from 25 to 30 million cases with a cost of more than 5 billion dollars per year. By six years of age more than 90% of children will have experienced at least one episode and many will have had more than three AOM episodes. Not surprisingly, more antibiotics are prescribed for treatment of this disease than for any other infection in humans.

Etiology and Pathogenesis

Understanding the etiologic spectrum and pathogenesis of AOM is extremely important when deciding if treatment is indicated and what therapy to prescribe. *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis* are the predominant pathogens associated with AOM and account for 90% to 95% of bacterial cases. *S pneumoniae* is the most prevalent pathogen, causing over 40% of all cases. Antimicrobial resistance patterns amongst strains of *S pneumoniae* and *H influenzae* continue to increase throughout the world. Current data indicate that roughly one third of pneumococcal isolates are now penicillin resistant, with approximately 60% of these expressing high levels of resistance (MIC > 2 mcg/ml). Similarly, 35 to 40% of *H influenzae* isolates produce B-lactamase.

Clinical Characteristics, Differential Diagnosis and Diagnostic Approach

Effective and appropriate management of AOM is dependent on making an accurate diagnosis. The diagnosis requires that the tympanic membrane (TM) must contain signs of inflammation defined by the presence of at least two of the following characteristics: abnormal color (white, amber or yellow), opacification other than from scarring, and/or decreased or absent mobility by pneumatic otoscopy. In addition the child must have at least one indicator of acute inflammation: ear pain, including unaccustomed tugging or rubbing of the ear, marked redness of the tympanic membrane and distinct fullness or bulging. Not infrequently the child will have systemic manifestations such as fever, vomiting and irritability.

Since the defining characteristics of AOM are inherent to the tympanic membrane, clinicians must be able to distinguish an infected ear from a normal ear. The first step is to establish whether middle ear effusion is present. This is best accomplished by direct visualization of the tympanic membrane (TM) with an otoscope and with pneumatic otoscopy to assess the mobility of the TM. The healthy tympanic membrane moves briskly inward when pressure is applied to the attached rubber bulb and it returns with the release of the bulb pressure. When middle ear effusion is present, the tympanic membrane has reduced or absent mobility on both positive and negative pressure.

Once the presence of middle ear effusion is confirmed by pneumatic otoscopy, the distinction must be made between AOM and otitis media with effusion (OME). It is vitally important to distinguish AOM from OME because antimicrobial therapy is not indicated in OME. In OME the TM may be translucent or opaque and is generally gray or pink in color. The TM may be neutral or retracted and mobility will be reduced as a consequence of middle ear effusion. However, the child lacks signs or symptoms of acute inflammation. It is important to note that over 50% of children with an initial diagnosis of AOM will have OME for at least 4 weeks after the initial diagnosis. This represents the normal resolution of the illness and does not warrant additional antimicrobial therapy.

Acute otitis media with otorrhea must also be distinguished from external otitis media. The history of relief from earache when drainage begins and the presence of a perforation of the TM help to make a distinction between these two diagnoses. The pain in external otitis frequently continues to increase even after drainage begins, and the canal is often swollen so that its width is notably reduced. Both AOM and external otitis must be distinguished from chronic suppurative otitis media. This condition occurs when the patient has persistent drainage and chronic perforation, with or without a myringotomy tube, which lasts for more than 6 weeks. The pathogenesis, bacteriology and treatment for chronic suppurative otitis media are very different from that of AOM.

Management, Therapy and Follow-up

Management of AOM should include antibiotic therapy except for selected patients over the age of 2 years, with assurance of adequate follow-up and option for observation with symptomatic therapy (usually mild disease in older children). Without treatment, children under 2 years of age are at highest risk of having persistence of signs and symptoms and suppurative complications, whereas children over 24 months of age are likely to have resolution of signs and symptoms without complications even if not treated with antibiotics. In Europe it is common for clinicians to use symptomatic treatment initially (in children over 1 year of age) and to institute antibiotic therapy only when symptoms persist. In the United States the use of antibiotics for AOM has been associated with a marked reduction in acute mastoiditis over the past three decades. Antibiotic treatment is further supported by recent reports of rising incidence of mastoiditis associated with the withholding of initial antimicrobial therapy in children who have AOM.

Recommendations for antibiotic therapy take into account available pharmacokinetic data (antibiotic absorption, serum concentration and middle ear fluid concentrations), pharmacodynamic data such as mode of action of each antibiotic (i.e. cell wall synthesis inhibition by penicillin) and available minimal inhibitory concentrations (MICs) of the various products approved for AOM treatment. Using these parameters, the American Academy of Pediatrics developed recommendations for antibiotic therapy for the management of AOM. (Table 1) Topical (otic) antibiotics are only indicated for those children with AOM and a perforated tympanic membrane or those with tympanostomy tubes in place at the time of diagnosis. Tympanocentesis and/or myringotomy is indicated for children who appear seriously

ill or toxic, who have a suppurative complication (mastoiditis and meningitis), for newborns or immunologically deficient children, and for children who have failed multiple courses of antibiotics. Adjunctive therapy with analgesics is not only indicated but also desired to reduce pain and discomfort associated with AOM. Topical and systemic decongestants and antihistamines have not been shown to be useful in the management of AOM or OME. Systemic steroids are not presently recommended for management of either of these conditions.

Complications

Mastoiditis is an uncommon complication of AOM that is seen predominantly in children less than 2 years of age. Affected children are usually acutely ill with signs of toxicity, and complain of localized pain and tenderness over the mastoid process (Figure 4). Bulging of the external ear secondary to subperiosteal abscess or inflammation or paralysis of the facial nerve are classic manifestations. Partially treated (subacute) mastoiditis may manifest itself as persistent fever, tenderness of the mastoid process and otorrhea. In contrast to uncomplicated AOM, the bacterial pathogens of mastoiditis are more virulent. Group A streptococci and *S. pneumoniae* are the two most common. *Haemophilus influenzae* type b (Hib) was seen frequently before universal immunization, and it should be considered in children who have not been adequately vaccinated. *Staphylococcus aureus* and Gram-negative enteric bacteria have been identified in patients who have subacute mastoiditis. Therapy for acute mastoiditis is a prolonged course of parenteral antibiotics with close observation for the development of possible further complications such as intracranial abscess, venous sinus thrombosis, osteomyelitis or hydrocephaly.

Additional Considerations and Future Directions

Otitis media is a common disease in children. Antibiotic resistance associated with this disease continues to increase and has changed treatment recommendations. Although antibiotic therapy remains the mainstay of therapy, clinical observation without antibiotics for children with mild disease may be warranted since the majority of uncomplicated cases resolve spontaneously. For those children who require treatment, antibiotic choices must be made according to pharmacokinetic/pharmacodynamic parameters. When choosing antibiotics one must consider the ability of the drug to achieve the magnitude required for efficacy against emerging resistant bacteria. The role of surgery (tympanostomy tube insertion and adenoidectomy) and pneumococcal vaccination in preventing recurrent AOM needs to be determined in controlled clinical studies.

Selected References

1. Berman S, Byrns PJ, Bondy J, Smith PJ, Lezotte D. Otitis media-related antibiotic prescribing patterns, outcomes, and expenditures in a pediatric medicaid population. *Pediatrics* 1997;100:585-92.
2. Teele DW, Klein JO, Rosner B. Epidemiology of otitis media during the first seven years of life in children in greater Boston: a prospective, cohort study. *J Infect Dis* 1989;160:83-94.

3. Giebink GS. Otitis media update: pathogenesis and treatment. *Ann Otol Rhinol Laryngol Suppl* 1992;155:21-23.
4. Dagan R. Treatment of acute otitis media - challenges in the era of antibiotic resistance. *Vaccine* 2000;19 Suppl 1:S9-S16.
6. Jacobs MR, Bajaksouzian S, Zilles A, Lin G, Pankuch GA, Appelbaum PC. Susceptibilities of *Streptococcus pneumoniae* and *Haemophilus influenzae* to 10 oral antimicrobial agents based on pharmacodynamic parameters: 1997 U.S. Surveillance study. *Antimicrob Agents Chemother* 1999;43:1901-8.
7. Marchant CD, Shurin PA, Turczyk VA, Wasikowski DE, Tutihasi MA, Kinney SE. Course and outcome of otitis media in early infancy: a prospective study. *J Pediatr* 1984;104:826-31.
8. Dowell SF, Butler JC, Giebink GS, Jacobs MR, Jernigan D, Musher DM, Rakowsky A, Schwartz B. Acute otitis media: management and surveillance in an era of pneumococcal resistance--a report from the Drug-resistant *Streptococcus pneumoniae* Therapeutic Working Group. *Pediatr Infect Dis J* 1999;18:1-9.
9. Van Zuijlen DA, Schilder AG, Van Balen FA, Hoes AW. National differences in incidence of acute mastoiditis: relationship to prescribing patterns of antibiotics for acute otitis media? *Pediatr Infect Dis J* 2001;20:140-144.
11. Ghaffar FA, Wordemann M, McCracken GH, Jr. Acute mastoiditis in children: a seventeen-year experience in Dallas, Texas. *Pediatr Infect Dis J* 2001;20:376-80.

TABLE 1: Antibiotic Treatment Guidelines for the Treatment of AOM

- High dose amoxicillin (90 mg/kg/d), regardless of age or risk factors, is the initial choice for the treatment of AOM.
- If the patient has a non-type I or uncertain allergy to β -lactams: oral second and third generation cephalosporins. Specifically, cefdinir, cefuroxime, or cefpodoxime.
- If the patient has anaphylaxis or severe allergy to β -lactams: azithromycin, clarithromycin, trimethoprim-sulfa, or erythromycin-sulfa. Macrolides are not recommended as a proper alternative in AOM, given the high bacteriologic failure rate documented in recent studies.
- Amoxicillin/clavulanate, cefdinir, cefpodoxime, and cefuroxime are second line options or for use when amoxicillin fails.(1)
- Parenteral ceftriaxone (50/mg/kg day for 1-3 days) should be reserved for cases of AOM with (a) Pre-existing vomiting and/or diarrhea, (b) sicker or febrile child with high white blood cell count, (c) questionable adherence, (d) refractory AOM or (e) AOM failures.