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OTITIS MEDIA: CURRENT INSIGHTS INTO ACUTE, CHRONIC SUPPURATIVE, AND EFFUSIVE FORMS

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ABSTRACT

Otitis media, encompassing acute otitis media (AOM), chronic suppurative otitis media (CSOM), and otitis media with effusion (OME), is among the most prevalent pediatric disorders worldwide and a leading cause of medical consultations and surgical interventions in children. Acute otitis media is most common in infants and young children, with Streptococcus pneumoniae and non-typeable Haemophilus influenzae as the primary bacterial pathogens, often in association with viral infections. Management strategies vary according to disease type and severity, ranging from observation and antibiotic therapy to surgical approaches in complicated cases. Chronic suppurative otitis media represents a long-standing inflammatory condition characterized by persistent ear discharge and tympanic membrane perforation, frequently requiring surgical management such as tympanoplasty. Otitis media with effusion, in turn, is primarily associated with middle ear fluid accumulation and hearing impairment, often managed with tympanostomy tube insertion or adenoidectomy in recurrent or persistent cases. Preventive measures, especially pneumococcal vaccination, play an essential role in reducing the incidence of otitis media and its complications. Despite advances in diagnostics and treatment, the growing number of intratemporal and intracranial complications highlights the importance of early recognition, individualized therapeutic approaches, and interdisciplinary collaboration. In conclusion, effective management of otitis media requires integration of pharmacological, surgical, and preventive strategies, supported by evidence-based guidelines and further clinical research to optimize outcomes and reduce disease burden.

KEYWORDS

Otitis Media, Infection, Acute Otitis Media, Otitis Media with Effusion, Suppurative Otitis Media, Children, Treatment

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Introduction

Acute otitis media (AOM) is an infection involving the middle ear space. This condition is part of a broader spectrum of middle ear inflammations, including chronic suppurative otitis media (CSOM) and otitis media with effusion (OME). It is the second most common reason for pediatric emergency department visits, second only to upper respiratory tract infections. Although AOM can occur at any age, it most frequently affects children between 6 and 24 months of age [1]. The most common bacterial pathogens responsible for acute otitis media are *Streptococcus pneumoniae* and non-typeable *Haemophilus influenzae* (NTHi), which together account for approximately 50–90% of cases. Less commonly, the disease is caused by bacteria such as *Moraxella catarrhalis* and *Streptococcus pyogenes*. Additionally, in many cases, AOM coexists with viral respiratory tract infections [2]. Management of acute otitis media depends on the type and severity of the condition. Standard treatment may include observation, antibiotic therapy, and in cases with complications, surgical intervention [3].

Anatomy of the Middle Ear

The human ear plays a crucial role in both the process of hearing and maintaining body balance. Structurally, it is divided into three main parts:

- The outer ear, which includes the auricle (pinna) and external auditory canal
- The middle ear
- The inner ear, containing the cochlea and the vestibular system
-

The middle ear is located within the tympanic cavity, a part of the temporal bone. Its primary function is to amplify sound waves received from the outer ear and transmit them through the ossicular chain to the fluid-filled structures of the inner ear and ultimately to the vestibulocochlear nerve (cranial nerve VIII).

Key anatomical components of the middle ear include:

- Auditory ossicles: malleus (hammer), incus (anvil), and stapes (stirrup)
- Oval window and round window
- Muscles: tensor tympani muscle and stapedius muscle
- Nerves: facial nerve (cranial nerve VII), chorda tympani, and the tympanic plexus
- Opening of the Eustachian tube
- Aditus ad antrum – the entrance to the mastoid antrum [4]

Acute Otitis Media (AOM)

It is estimated that up to 80% of children will experience otitis media at some point in their lives, and 80–90% of them will also develop otitis media with effusion before starting school [5].

Treatment of AOM

Acute otitis media (AOM) is one of the most frequent infections in children. The most characteristic and troublesome symptom is ear pain. Although antibiotics are frequently used in the treatment of AOM, their effectiveness in relieving pain after two to three days is only moderate [6].

Prevention of AOM

Vaccination against pneumococcal infections is a key component in the prevention of acute otitis media (AOM) in children. A review of 48 observational studies showed that the PCV7, PCV10, and PCV13 vaccines reduce the incidence of AOM, particularly in children under 2 years of age. Effectiveness varied depending on the vaccine and age group, ranging from a few percent to over 80%. Although the results are promising, further research in diverse populations is needed to confirm their long-term effectiveness and to optimize vaccination strategies [7].

Complications of AOM

In recent years, there has been a noticeable increase in the incidence of intratemporal and intracranial complications associated with acute otitis media (AOM), particularly in the pediatric population. In young children, the risk of developing complications is elevated due to the immaturity of the immune system and diagnostic challenges resulting from the often nonspecific clinical presentation of AOM. One of the most frequently reported complications is acute mastoiditis, the incidence of which has risen significantly in recent years. This trend is supported by data from the Czech Republic, where a marked increase in cases of acute mastoiditis in children has been observed. One possible explanation is the shift in treatment strategies for AOM—specifically, the move away from early antibiotic therapy. Available data clearly indicate that AOM complications are more common in younger children, highlighting the importance of early and accurate diagnosis as well as the need for individualized therapeutic approaches [8].

Chronic Suppurative Otitis Media (CSOM)

Chronic suppurative otitis media (CSOM) is a long-standing infectious and inflammatory condition affecting the middle ear and mastoid cavity. It is typically characterized by persistent ear discharge resulting from perforation of the tympanic membrane [9]. The disease involves inflammatory episodes lasting more than 12 weeks, which can lead to damage of the middle ear structures. Tympanoplasty is a surgical procedure performed to close the tympanic membrane perforation and, if necessary, to reconstruct the ossicles. The goal is to prevent recurrent infections and improve hearing function [10].

CSOM most often develops in early childhood, typically around the age of two, with the highest risk observed in children from families with low socioeconomic status [11].

The primary symptoms of CSOM include persistent ear discharge and hearing loss [9].

Topical antibiotics are used to eliminate or inhibit the growth of microorganisms responsible for the infection. They can be used alone or as part of combination therapy with other treatment modalities for CSOM, such as corticosteroids, antiseptic preparations, or aural toilet (ear cleaning). They are often prescribed in combination formulations with steroids [12].

Treatment of CSOM

In the treatment of chronic suppurative otitis media (CSOM), topical quinolones are the preferred therapeutic option—they demonstrate equal or greater efficacy compared to aminoglycosides, without the associated risk of ototoxicity. Quinolones effectively combat pathogens and reduce ear discharge.

In the absence of coexisting cholesteatoma, parenteral antimicrobial therapy combined with thorough ear cleaning is typically sufficient to control the infection. However, in treatment-resistant cases, tympanomastoidectomy may be necessary [11].

Wullstein Classification of Tympanoplasty

- **Type I:** Involves repair of the tympanic membrane only, with no damage to the middle ear ossicles. This type is equivalent to myringoplasty.
- **Type II:** Involves reconstruction of both the tympanic membrane and middle ear structures; the malleus is damaged. The graft is attached to the incus.
- **Type III:** The tympanic membrane graft is anchored directly to the head of the stapes, as both the malleus and incus are destroyed.
- **Type IV:** The graft is placed onto the mobile footplate of the stapes.
- **Type V:** The repair involves the stapes footplate [10].

Aural Toilet

Aural toilet refers to various manual techniques used to clean the ear. These methods may include dry mopping (using cotton wool or absorbent paper), suction—usually performed under microscopic guidance—or ear irrigation, which can be done manually or with automated equipment.

Dry mopping can be effective for removing mucopurulent discharge; however, compared to irrigation or microsuction, it is less effective at eliminating desquamated epithelium or thick pus [13].

Otitis Media with Effusion

Otitis media with effusion (OME) is a condition characterized by the presence of fluid in the middle ear without signs of acute infection. The accumulated fluid in the middle ear and Eustachian tube exerts pressure on the tympanic membrane, disrupting its normal vibration [14]. The presence of fluid can lead to hearing impairment, and if it persists over time, it may contribute to behavioral problems and delays in expressive language development [15].

OME can occur in both children and adults, although its underlying causes vary with age. In young children, the Eustachian tube is more horizontally oriented, which promotes fluid retention. As a person grows, the tube elongates and takes on a more oblique (caudal) orientation, facilitating proper drainage and function. This anatomical difference is why OME is significantly more common in children than in adults [14].

Treatment of OME

The treatment of otitis media with effusion (OME) includes observation (watchful waiting), pharmacological, surgical, and mechanical methods. One non-pharmacological technique is autoinflation—a self-administered method aimed at improving middle ear ventilation and facilitating fluid clearance by creating positive air pressure in the nasal cavity and nasopharynx (e.g., using a nasal balloon or a specialized device). Positive pressure, sometimes combined with swallowing, helps open the Eustachian tube, which promotes better aeration of the middle ear [15]. Antibiotics may be used to eliminate bacteria present in the effusion or associated with biofilm formation [16]. One of the most commonly recommended treatments, especially for persistent effusion, is the placement of tympanostomy tubes, which represent the preferred surgical intervention [17]. As an alternative or adjunctive approach, adenoidectomy has often been employed as a therapeutic option. Research has focused on assessing its efficacy and risk, both as a standalone procedure and in combination with ventilation tube insertion [18].

Use of Tympanostomy Tubes in the Treatment of Middle Ear Disorders

Insertion of tympanostomy tubes is a common surgical procedure, particularly in the pediatric population, used to alleviate symptoms associated with middle ear effusion, recurrent episodes of acute otitis media (AOM), and chronic, treatment-resistant ear infections. This procedure facilitates ventilation of the tympanic cavity and promotes fluid drainage, resulting in improved hearing and reduced risk of long-term complications.

The procedure involves making a small incision in the tympanic membrane through which the tube is inserted. In children, it is typically performed under general anesthesia, whereas in adolescents and adults, local anesthesia is often sufficient. The procedure is generally well tolerated but requires regular postoperative monitoring to detect possible complications early and to evaluate the effectiveness of the treatment.

Indications for tympanostomy tube insertion include:

- Recurrent acute otitis media
- Chronic otitis media with effusion (OME)
- Infections unresponsive to conservative treatment [19].

Adenoidectomy

Adenoidectomy, the surgical removal of the pharyngeal tonsil (adenoid), is one of the most commonly performed ENT procedures in children worldwide, especially in cases of recurrent otitis media [20]. The procedure was first introduced in the 19th century by Hans Wilhelm Meyer. Over the past 150 years, it has undergone significant advancements and is now characterized by a low risk of complications and strong evidence supporting its long-term clinical benefits.

Adenoidectomy is most frequently indicated for the treatment of:

- Otitis media with effusion (OME)
- Chronic inflammation of the adenoid
- Pediatric obstructive sleep apnea [21].

Conclusions

Otitis media—in its acute, chronic suppurative, and effusive forms—remains one of the most common health issues in the pediatric population, significantly impacting hearing, speech development, and overall quality of life in children. Accurate diagnosis and appropriately selected therapeutic strategies, including observation, pharmacological treatment, tympanostomy tube insertion, and adenoidectomy, are crucial for preventing complications and improving treatment outcomes. Surgical interventions may be effective in cases of chronic suppurative otitis media (CSOM).

Vaccination, particularly against pneumococcal infections, plays a vital role in prevention. Effective treatment requires interdisciplinary collaboration and the application of evidence-based approaches. Despite advances in diagnostics and therapy, further clinical and epidemiological studies are needed to better understand pathophysiological mechanisms, optimize treatment protocols, and reduce the risk of complications and recurrences.

An integrated diagnostic and therapeutic approach, based on current guidelines and individualized care, remains the key to improving the quality of life for individuals affected by these conditions.

REFERENCES

1. Danishyar A, Ashurst JV. Acute Otitis Media. 2023 Apr 15. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 29262176.
2. Ubukata K, Morozumi M, Sakuma M, Takata M, Mokuno E, Tajima T, Iwata S; AOM Surveillance Study Group. Etiology of Acute Otitis Media and Characterization of Pneumococcal Isolates After Introduction of 13-Valent Pneumococcal Conjugate Vaccine in Japanese Children. Pediatr Infect Dis J. 2018 Jun;37(6):598-604. doi: 10.1097/INF.0000000000001956. PMID: 29474258.
3. Mosquera FEC, de la Rosa Caldas M, Naranjo Rojas A, Perlaza CL, Liscano Y. Probiotic, Prebiotic, and Synbiotic Supplementation for the Prevention and Treatment of Acute Otitis Media: A Systematic Review and Meta-Analysis. Children (Basel). 2025 Apr 30;12(5):591. doi: 10.3390/children12050591. PMID: 40426770; PMCID: PMC12109743.
4. Akanmode AM, Winters R. Tympanocentesis. 2023 Nov 17. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 32809429.
5. Dissanayake G, Zergaw M, Elgendy M, Billey A, Saleem A, Zeeshan B, Nassar ST. Effectiveness of Pneumococcal Conjugate Vaccines Over Antibiotic-Resistant Acute Otitis Media in Children: A Systematic Review. Cureus. 2024 Aug 25;16(8):e67771. doi: 10.7759/cureus.67771. PMID: 39323722; PMCID: PMC11422702.
6. Ranakusuma RW, Pitoyo Y, Safitri ED, Thorning S, Beller EM, Sastroasmoro S, Del Mar CB. Systemic corticosteroids for acute otitis media in children. Cochrane Database Syst Rev. 2018 Mar 15;3(3):CD012289. doi: 10.1002/14651858.CD012289.pub2. PMID: 29543327; PMCID: PMC6492450.
7. Marra LP, Sartori AL, Martinez-Silveira MS, Toscano CM, Andrade AL. Effectiveness of Pneumococcal Vaccines on Otitis Media in Children: A Systematic Review. Value Health. 2022 Jun;25(6):1042-1056. doi: 10.1016/j.jval.2021.12.012. Epub 2022 Feb 4. PMID: 35667776.
8. Dhooge IJ, Albers FW, Van Cauwenberge PB. Intratemporal and intracranial complications of acute suppurative otitis media in children: renewed interest. Int J Pediatr Otorhinolaryngol. 1999 Oct 5;49 Suppl 1:S109-14. doi: 10.1016/s0165-5876(99)00144-5. PMID: 10577787.
9. Chong LY, Head K, Webster KE, Dew J, Richmond P, Snelling T, Bhutta MF, Schilder AG, Burton MJ, Brennan-Jones CG. Systemic antibiotics for chronic suppurative otitis media. Cochrane Database Syst Rev. 2021 Feb 4;2(2):CD013052. doi: 10.1002/14651858.CD013052.pub2. Update in: Cochrane Database Syst Rev. 2025 Jun 9;6:CD013052. doi: 10.1002/14651858.CD013052.pub3. PMID: 35819801; PMCID: PMC8094871.
10. Brar S, Watters C, Winters R. Tympanoplasty. 2023 Jul 4. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 33351422.
11. Rosario DC, Mendez MD. Chronic Suppurative Otitis. 2023 Jan 31. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 32119479.
12. Brennan-Jones CG, Chong LY, Head K, Burton MJ, Schilder AG, Bhutta MF. Topical antibiotics with steroids for chronic suppurative otitis media. Cochrane Database Syst Rev. 2020 Aug 27;8(8):CD013054. doi: 10.1002/14651858.CD013054.pub2. Update in: Cochrane Database Syst Rev. 2017 Aug 27;(8):CD013054. doi: 10.1002/14651858.CD013054.pub2. PMID: 35659673; PMCID: PMC8212588.
13. Bhutta MF, Head K, Chong LY, Daw J, Schilder AG, Burton MJ, Brennan-Jones CG. Aural toilet (ear cleaning) for chronic suppurative otitis media. Cochrane Database Syst Rev. 2020 Sep 14;9(9):CD013057. doi: 10.1002/14651858.CD013057.pub2. Update in: Cochrane Database Syst Rev. 2025 Jun 9;6:CD013057. doi: 10.1002/14651858.CD013057.pub3. PMID: 32926406; PMCID: PMC8095014.

14. Searight FT, Singh R, Peterson DC. Otitis Media With Effusion. 2023 May 20. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 30855877.
15. Webster KE, Mulvaney CA, Galbraith K, Rana M, Marom T, Daniel M, Venekamp RP, Schilder AG, MacKeith S. Autoinflation for otitis media with effusion (OME) in children. Cochrane Database Syst Rev. 2023 Sep 26;9(9):CD015253. doi: 10.1002/14651858.CD015253.pub2. PMID: 37750500; PMCID: PMC10521168.
16. Mulvaney CA, Galbraith K, Webster KE, Rana M, Connolly R, Marom T, Daniel M, Venekamp RP, Schilder AG, MacKeith S. Antibiotics for otitis media with effusion (OME) in children. Cochrane Database Syst Rev. 2023 Oct 23;10(10):CD015254. doi: 10.1002/14651858.CD015254.pub2. PMID: 37870130; PMCID: PMC10591283.
17. MacKeith S, Mulvaney CA, Galbraith K, Webster KE, Connolly R, Paing A, Marom T, Daniel M, Venekamp RP, Rovers MM, Schilder AG. Ventilation tubes (grommets) for otitis media with effusion (OME) in children. Cochrane Database Syst Rev. 2023 Nov 15;11(11):CD015215. doi: 10.1002/14651858.CD015215.pub2. PMID: 37965944; PMCID: PMC10646987.
18. MacKeith S, Mulvaney CA, Galbraith K, Webster KE, Paing A, Connolly R, Marom T, Daniel M, Venekamp RP, Schilder AG. Adenoidectomy for otitis media with effusion (OME) in children. Cochrane Database Syst Rev. 2023 Oct 23;10(10):CD015252. doi: 10.1002/14651858.CD015252.pub2. PMID: 37870083; PMCID: PMC10591285.
19. Spaw M, Agarwal N, Camacho M. Tympanostomy Tube Insertion. 2024 Mar 5. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 33351417.
20. van den Aardweg MT, Schilder AG, Herkert E, Boonacker CW, Rovers MM. Adenoidectomy for otitis media in children. Cochrane Database Syst Rev. 2010 Jan 20;2010(1):CD007810. doi: 10.1002/14651858.CD007810.pub2. PMID: 20091650; PMCID: PMC12151269.
21. Miller BJ, Gupta G. Adenoidectomy. 2023 Feb 13. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 30570973.