Chapter 20

Otitis Media and Otitis Externa

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Otitis Media

Pathophysiology

Acute otitis media (AOM) is an infection of the middle ear cavity and is one of the most common bacterial infections in childhood.\(^1\) Seventy-five percent of children experience at least 1 episode prior to entering school.\(^2\) To diagnose AOM, 3 criteria need to be met: 1) signs and symptoms of middle ear inflammation 2) the presence of middle ear effusion and 3) acute onset (often abrupt) of signs and symptoms of middle ear inflammation and effusion.\(^1\) Symptoms include acute ear pain (often unilateral and developing over a few hours), fever and reduced hearing.\(^1\) Tugging or pulling on the ears is often described, but this is a very nonspecific sign.\(^1\) Children too young to complain of pain or pressure in the ears may display irritability, excessive fussiness, poor feeding and disrupted sleep patterns. Acute otitis media is more common in the winter months. A recent history of viral upper respiratory tract infection is often present.\(^2\) The microorganisms most commonly associated with AOM are *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis*.\(^1,2\)

AOM has a high spontaneous recovery rate; 80% of children experience spontaneous symptomatic relief with placebo or no drug therapy.\(^3,4\) For this reason, the concept of “watchful waiting” is advocated after appropriate healthcare practitioner assessment and diagnosis of AOM. Rather than immediate initiation of antibiotic therapy, appropriately selected children are managed with analgesic therapy for the first 24–48 hours. This includes children >6 months of age with no craniofacial abnormalities who have uncomplicated AOM (normal host, no otorrhea, no history of chronic or recurrent AOM) without severe pain or systemic illness, and whose caregivers are able to recognize severe illness, take the child for immediate assessment, and provide access to follow-up care.\(^1,2\)

Goals of Therapy

- Relieve symptoms of fever, pain and irritability
- Eliminate bacteria from the middle ear
- Ensure appropriate therapy to reduce the risk of resistant pathogens and drug-related adverse effects such as antibiotic-associated diarrhea
- Prevent complications, e.g., mastoiditis, intracranial infection, facial paralysis

Nonpharmacologic Therapy

Comfort measures, such as warmed oils, warm or cold compresses and heating pads have been used by parents and caregivers for years, although there are no studies evaluating their effectiveness. If tried, heat therapy should be used cautiously and with close supervision in children, to avoid burns. A young child should never sleep with a hot water bottle or heating pad. Question the caregiver about whether there has been any drainage from the ear prior to recommending any topical therapy. Warmed oil should not be used if there is a chance of perforation or any suspicion of drainage. Warming of drops or oil should be done by rolling the bottle between the palms; other methods such as placing the bottle
in a glass of warm water or using the microwave oven should be avoided as serious burns have been reported.

**Pharmacologic Therapy**

For more information on management of acute otitis media, consult the *Compendium of Therapeutic Choices: Acute Otitis Media in Childhood.*

- If antibiotics are used, systemic therapy is required; topical agents are not used in AOM.
- Adequate analgesia with usual doses of acetaminophen or ibuprofen is important (see Chapter 7: Fever, Table 5).
- Topical analgesics may provide short-term analgesia in children with AOM, but should not replace oral analgesics.\(^5,6\) Topical analgesics may cause local hypersensitivity reactions.
- Decongestants and antihistamines, which were recommended in the past, do not speed the resolution of effusion and can have significant adverse effects in children and therefore should not be used.\(^7,8\)

For a more complete discussion of acute otitis media, see Suggested Readings.

**Otitis Externa**

**Pathophysiology**

Otitis externa is defined as inflammation of the external auditory canal (EAC) and may also involve the pinna or tympanic membrane (TM). Otitis externa is often due to infection.\(^9,10,11,12\) The EAC is warm, dark and prone to becoming moist. This provides an excellent environment for bacteria or fungi to proliferate, particularly if the EAC is traumatized. Otitis externa can be categorized as acute diffuse, acute localized, chronic, eczematous or necrotizing.\(^12\) The main focus of this chapter is acute diffuse otitis externa.

**Acute Diffuse Otitis Externa**

Predisposing factors for acute diffuse otitis externa include:\(^9,10,11,13\)

- Too little cerumen—cerumen provides antibacterial action by physically protecting the canal and maintaining a low pH
- Too much cerumen, which can lead to occlusion and maceration
- Moisture (swimming, bathing, water sports, perspiration, increased humidity)—macerates underlying skin and raises pH
- Trauma to EAC (fingernails, cotton-tipped swabs, other foreign objects, overzealous wax removal)—abrasion and laceration allowing inoculation of organisms
- Chronic dermatologic disorders
- Hearing aids
- Narrow, hairy ear canal.

The most common etiology of acute otitis externa is bacterial infection. Fungal overgrowth occurs rarely, and primarily in patients who have received prior antibiotic therapy. The 2 most common microorganisms causing acute otitis externa are *Pseudomonas aeruginosa* (20–60%) and *Staphylococcus aureus* (10–70%).\(^10,11\)

Bacterial otitis externa produces ear pain or discomfort (otalgia), otorrhea, pruritus and tenderness, especially on manipulation of the ear.\(^10,11\) These symptoms may be more intense than those seen with fungal otitis externa. Cellulitis of the pinna and regional lymphadenopathy may be present.\(^10\) Fungal
otitis externa may be asymptomatic or may produce pruritus and fullness in the ear. It classically occurs after prolonged treatment of bacterial otitis externa with antibiotics which alter the bacterial flora of the EAC. The EAC may contain black, grey, bluish green, yellow or white fungal elements and debris.

Acute Localized Otitis Externa (Furunculosis)

This is an acute localized “boil” (infected hair follicle) in the ear canal usually due to *S. aureus*. It produces localized pain, itching, edema, erythema and possibly a fluctuance or abscess. The pain subsides when the boil comes to a head and bursts. Topical mupirocin or fusidic acid can be used for mild cases. Incision and drainage may be required for some patients. Patients appearing to need incision and drainage should be seen by a healthcare practitioner with appropriate training. In more severe cases, systemic antibiotics active against *S. aureus* should be considered.

Chronic Otitis Externa

Chronic otitis externa is characterized as a thickening of the EAC skin secondary to low-grade infection and inflammation. There is usually unrelenting pruritus, mild discomfort and dry, flaky skin in the EAC with lack of cerumen. This is often due to nonbacterial causes including allergic contact dermatitis.

Eczematous Otitis Externa

Eczematous otitis externa may be due to a variety of skin conditions, including atopic, seborrheic or contact dermatitis, psoriasis, lupus erythematosus, neurodermatitis and infantile eczema. Lesions typically occur elsewhere on the body, especially the head and neck, as well as the auricle and EAC. Appearance may range from mild erythema and scaling with atopic dermatitis to the typical adherent scales of psoriasis (see Chapter 55: Atopic, Contact, and Stasis Dermatitis; Chapter 58: Dandruff and Seborrheic Dermatitis; and Chapter 71: Psoriasis for a more complete description of the lesions). The most common symptom is pruritus, although erythema, edema, crusting and oozing may be present. The lesions may become secondarily infected with bacteria or fungi. Treatment is primarily management of the underlying condition.

Necrotizing (Malignant) Otitis Externa

This is an infection that extends to the mastoid or temporal bone and is usually seen in immunocompromised patients or those with diabetes. Urgent referral and systemic antimicrobial therapy are required.

This chapter focuses on the management of acute diffuse otitis externa.

Goals of Therapy

- Eliminate pathogenic microorganisms
- Control pain
- Restore the canal to normal health so it resists infection—return to normal acidic pH and adequate cerumen

Patient Assessment

Acute otitis externa is characterized by otalgia (70% of cases), itching (60%) or fullness (22%) with or without hearing loss (32%) and discharge in or coming from the ear (otorrhea). Incidence peaks in children age 7–12 years and declines after the age of 50. It is unilateral in 90% of cases. The discomfort can range from pruritus to severe pain. The pain is often worse with motion of the ear.
(pushing the tragus or pulling the pinna),\textsuperscript{10} including movement caused by chewing.\textsuperscript{11} Determining the type of otitis externa (infectious vs. noninfectious) can be assisted by the description of the signs and symptoms above and the presence of contributing factors (e.g., history of swimming or trauma to the EAC), or the presence of dermatologic conditions on areas of the body other than the EAC.

The drug must be delivered to the infected tissue if topical therapy is to be successful.\textsuperscript{10,16} Cleansing must be done by a healthcare practitioner with appropriate training. Therefore, if there is significant edema or debris in the EAC, the patient may need to be referred so that aural toilet can be performed or for a wick to be placed.\textsuperscript{10} In mild cases, a topical product may be initiated without cleansing; recommendations for pain management are important.

**Nonpharmacologic Therapy**

Adequate cleansing of the ear canal with removal of debris may be required frequently so that topical therapy can be effective.\textsuperscript{9,10} If the canal is not patent, ear wicks may be inserted by a healthcare practitioner to reduce edema and swelling and provide a mechanism for drug delivery to the canal.\textsuperscript{10,11} These may remain in place for 2–5 days.

**Pharmacologic Therapy**

For comparative ingredients of nonprescription products, consult the *Compendium of Products for Minor Ailments*—Analgesic Products: Internal Analgesics and Antipyretics; Otic Products.

Topical treatment is the mainstay of therapy, although in more severe cases, when infection has spread beyond the EAC, when otitis media coexists, or if the patient has a condition such as diabetes or immunodeficiency, systemic antibiotics may be required.\textsuperscript{10} In uncomplicated cases, systemic therapy does not improve outcomes compared with topical therapy and increases the risk of adverse effects and antibiotic resistance and time to clinical cure.\textsuperscript{17} Topical therapy options include acidifying agents, antibiotics alone or antibiotic/corticosteroid combinations (see Table 1). Comparative trials show similar outcomes among approaches; therefore, the choice is determined by healthcare practitioner and patient preference, the side effect profile of the agents and cost.\textsuperscript{10,11,12,18,19} One trial demonstrated that corticosteroid drops (with either acetic acid or antibiotic) are more effective than acetic acid alone and recommended that acetic acid alone not be used in adult patients.\textsuperscript{20} In patients whose symptoms last longer than a week, acetic acid may be less effective than an antibiotic/corticosteroid combination; efficacy at 1 week is similar.\textsuperscript{18} Advantages and disadvantages of the various products are outlined in Table 1.

Antibiotic drops are available as both otic and ophthalmic preparations. Both nonprescription and prescription products are available. Otic products are more acidic than ophthalmic preparations and may cause burning on instillation. If a patient cannot tolerate otic preparations, ophthalmic preparations may be more comfortable.\textsuperscript{21} Preparations for treatment of otitis externa may contain corticosteroids, which reduce inflammation and edema and may resolve symptoms more quickly; however, this has not been shown in all studies and corticosteroids may occasionally be topical sensitizers.\textsuperscript{18}

One particular concern with topical therapy of acute otitis externa is the potential ototoxicity of aminoglycosides.\textsuperscript{22} This is a documented adverse effect of systemically administered aminoglycosides. If the tympanic membrane is intact, the risk with topical administration is extremely small. Risk factors for ototoxicity include ruptured tympanic membrane, use of the product for more than 1 week and continued use after otorrhea has subsided. Topical fluoroquinolones have not been associated with ototoxicity.

Enough liquid to fill the canal (3–4 drops) should be instilled 3–4 times daily (most products except fluoroquinolones). Symptoms will last for approximately 6 days after treatment begins; however,
improvement in symptoms should occur within 48–72 hours. Patients should be treated for 1 week. If symptoms are not completely gone, therapy can be continued until symptoms resolve plus a few days beyond (up to 2 weeks). In 65–90% of patients, clinical resolution occurs in 7–10 days. For information on correct instillation of eardrops, see Eardrops—What You Need to Know.

Fungal otitis externa often responds to cleansing and acidification alone, although topical antifungal agents (clioquinol, clotrimazole, tolnaftate) may also be used. Some preparations may need to be compounded.

Otitis externa can be very painful. Usual doses of acetaminophen, ibuprofen or naproxen sodium can be used for analgesia (ASA can be used in adults). Although some otic preparations contain topical anesthetics, the efficacy of these agents has not been determined in acute otitis externa, and topical hypersensitivity reactions can occur. If topical anesthetic agents are used in addition to other topical therapy, this will dilute the acidifier or antibiotic present in the canal. Avoid their use in otitis externa. Systemic analgesia is the preferred recommendation.

**Eczematous Otitis Externa**

Eczematous otitis externa is managed by treating the underlying dermatologic disease (e.g., seborrhea, psoriasis, acne). Contact dermatitis commonly occurs on or in the ears, and grooming products (e.g., shampoos, hair sprays and hair dyes) are common allergens. Hearing aids and earplugs may also cause dermatitis of the EAC. Neomycin is one of the topical medications that most commonly causes allergic contact dermatitis. Patients sensitive to neomycin may also react to tobramycin. Other agents commonly placed in the ear that are reported to cause contact dermatitis include benzalkonium chloride, benzocaine and propylene glycol.

Management includes avoiding the offending agent, applying acetic acid solution to dry oozing lesions and re-acidify the canal, or symptomatic therapy with a topical corticosteroid.

**Prevention of Recurrence**

Provide information on how to prevent a recurrence to individuals who develop acute otitis externa:

- After swimming or bathing, dry the external canal with a blow dryer on low setting or by instillation of acidifying or alcohol drops.
- Avoid overzealous cleansing and scratching (trauma) of the ear canal.
- Avoid cotton-tipped swabs.
- Avoid water sports for at least 7–10 days during treatment.
- Ear plugs and bathing caps may be used to keep the ears dry; however, there is little evidence to guide recommendations. Frequent use of ear plugs may also act as a local irritant and promote infection.

**Monitoring of Therapy**

Symptoms should be significantly reduced by day 3 of therapy, and for most patients symptoms should have completely resolved in a week. Occasionally up to 14 days of treatment is needed. Follow up with the patient in 3–5 days to ensure symptoms are improving and at the end of treatment to ensure resolution. If symptoms worsen or do not resolve, consider the following: the patient may be reacting to the medication (contact dermatitis); a superinfection may have developed; the diagnosis may be incorrect; improper or infrequent use of eardrops; inadequate penetration of topical agents due to debris or narrowing of the canal; immunosuppression or malignant otitis externa; or the organism is not susceptible to the topical agent selected. Assessment for further treatment will be required.
Advice for the Patient

Advise patients on:

- Prevention of recurrences
- Methods of pain control
- Correct use of eardrops
- Possible side effects of treatment and their management (see Table 1)
- When to see a healthcare practitioner.
### Table 1: Drugs for Otitis Externa

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
<th>Indications</th>
<th>Adverse Effects</th>
<th>Comments</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidifying Agents</td>
<td>acetic acid 2%\textsuperscript{25}</td>
<td>Prevention and treatment of mild AOE</td>
<td>Can be irritating to inflamed canal. Possibly ototoxic.</td>
<td>Broad-spectrum antibacterial. Restores acidity to canal. Lower cost than antibiotics. No commercial product available. May be prepared by diluting white vinegar with equal parts isopropyl alcohol or water.\textsuperscript{10}</td>
<td>$</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>ciprofloxacin</td>
<td>Treatment of AOE</td>
<td>Well tolerated. Not associated with ototoxicity.</td>
<td>Active against many gram-negative organisms including \textit{P. aeruginosa} and some gram-positive (\textit{S. aureus}). Twice-daily dosing. Topical quinolones provide similar clinical cure rates as other topical antibiotics.\textsuperscript{19}</td>
<td>$</td>
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<tr>
<td></td>
<td>Ciloxan, generics</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>gramicidin/polymyxin B</td>
<td>Treatment of AOE</td>
<td>Potentially ototoxic.</td>
<td>Gramicidin—active against gram-positive organisms. Polymyxin B—active against gram-negative organisms. Ophthalmic solutions can be used in the ears.</td>
<td>$$</td>
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<tr>
<td></td>
<td>Optimyxin Ear Drops, Polysporin Eye/Ear Drops</td>
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<tr>
<td></td>
<td>moxifloxacin</td>
<td>Treatment of AOE</td>
<td>See ciprofloxacin.</td>
<td>See ciprofloxacin. Ophthalmic solutions can be used in the ears.</td>
<td>$$</td>
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<td></td>
<td>Vigamox</td>
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<td></td>
<td>ofloxacin</td>
<td>Treatment of AOE</td>
<td>See ciprofloxacin.</td>
<td>See ciprofloxacin. Ophthalmic solutions can be used in the ears.</td>
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<td></td>
<td>Ocuflox, generics</td>
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<td></td>
<td>tobramycin</td>
<td>Treatment of AOE</td>
<td>Potentially ototoxic, particularly with perforated tympanic membrane, tympanostomy tubes or use &gt;1 wk.</td>
<td>Aminoglycosides active against gram-negative organisms (e.g., \textit{Pseudomonas}) and \textit{S. aureus}. Ophthalmic solutions can be used in the ears.</td>
<td>$</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>dexamethasone Maxidex</td>
<td>Dermatologic causes of AOE</td>
<td>May cause hypersensitivity reactions.</td>
<td>Anti-inflammatory properties reduce swelling and edema. If bacterial etiology combine with acidifier or antibiotic. Ophthalmic solutions can be used in the ears.</td>
<td>$</td>
</tr>
<tr>
<td>Class</td>
<td>Drug</td>
<td>Indications</td>
<td>Adverse Effects</td>
<td>Comments</td>
<td>Cost&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td><strong>Antibiotic/ Corticosteroid Combinations</strong></td>
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<tr>
<td></td>
<td>ciprofloxacin/ dexamethasone</td>
<td>Treatment of AOE</td>
<td>See ciprofloxacin. See dexamethasone.</td>
<td>See ciprofloxacin. See dexamethasone.</td>
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<tr>
<td></td>
<td>Ciprodex</td>
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<td>Locacorten Vioform Eardrops</td>
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<tr>
<td></td>
<td>framycetin/gramicidin/ dexamethasone</td>
<td>Treatment of AOE</td>
<td>See tobramycin. See dexamethasone.</td>
<td>Framycetin active against gram-negative organisms (but not <em>Pseudomonas</em>) and <em>S. aureus</em>. Gramicidin—active against gram-positive organisms. See dexamethasone.</td>
<td>$</td>
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<tr>
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<td>Sofracort</td>
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</table>

| **Miscellaneous**             | antipyrine/benzocaine             | Topical analgesia  | Benzocaine may produce topical hypersensitivity reactions. Antipyrine—mild anesthetic; can cause burning and itching. May mask symptoms of worsening AOE. | Do not use with ruptured tympanic membrane. Oral analgesics preferred. | $                |
|                              | Auralgan                          |                    |                                                                                 |                                                                          |                  |
|                              | isopropyl alcohol 95% glycerin 5% | Prevention of AOE  | Painful when used in acute otitis externa.                                      | Useful drying agent.                                                     | $                |
|                              | Auro-Dri Ear Water                |                    |                                                                                 |                                                                          |                  |

<sup>a</sup> Cost of smallest available pack size; includes drug cost only.

**Abbreviations:** AOE = acute otitis externa

**Legend:** $ < $10 $10–20 $$$ $20–30
Suggested Readings

**Otitis Externa**


**Otitis Media**


References

Acute Otitis Externa (Swimmer’s Ear)—What You Need to Know

What is acute otitis externa?

Acute otitis externa, or “swimmer's ear,” is an infection of the ear canal. The symptoms are itching or pain in the ear and liquid draining from it. The ear may become plugged. Your hearing may be affected.

What causes acute otitis externa?

The skin in your ears may become infected because of:

- Too much water in the ear (from bathing, swimming or water sports)
- Removing the natural earwax that protects the ear canal
- Skin conditions in the ear canal (such as eczema)
- Using cotton-tipped swabs, fingernails or other sharp objects in the ear canal
- Wax buildup due to hearing aids or other ear devices

What is the treatment for acute otitis externa?

- The usual treatment is prescription eardrops. A healthcare provider may have to clean the ear canal for the drops to work.
- Most drops need to be used 3 or 4 times a day.
- Use the drops until 3 days after all symptoms are gone.
- Symptoms are usually much better in 3 days and should be gone in 10 days.
- While you are using eardrops:
  - Keep your ears as dry as possible. Take a bath instead of a shower. Avoid swimming and water sports until the treatment is done.
  - Don't poke your fingers or other objects into your ears.

What can you do to prevent acute otitis externa?

- Keep the ear canal as dry as possible:
  - Dry ears with a towel after swimming or bathing. Use a blow dryer set on low to dry the ear canal. You can also use diluted vinegar or alcohol drops in the ear.
  - Try using a bathing cap or ear plugs when swimming. If this makes it worse, stop using.
- **Do not** clean earwax out of your ears:
  - Earwax protects against infection. The ears generally clean themselves. If you have pain in your ears from earwax, see your healthcare provider.
- **Do not** put anything in the ear canal except eardrops. Fingernails, cotton-tipped swabs and other objects irritate and damage the skin. If the skin is damaged you are more likely to get an infection.
Hints to help you use eardrops safely:

If possible, get someone to put the drops in your ear for you.

■ Warm the eardrops to body temperature by holding the bottle in your hands for a few minutes. Do not heat the drops in hot water or the microwave because this could cause pain and dizziness or serious burns.

■ Always wash your hands with soap and water before administering the eardrops.

■ The eardrops must be kept clean. Do not let the dropper touch the ear or anything else that could have germs on it and let germs get into your eardrops.

■ Shake the bottle before using if there is a “Shake Well” label on the bottle. Lie on your side so that the ear you are treating is facing up.

■ The ear canal must be straight so that the eardrops can reach the affected tissue. The direction that you pull the top of the ear depends on the person's age.
  – For adults and children over 3 years, gently pull the top of the ear up and back.
  – For children under 3 years, gently pull the top of the ear down and back

■ Hold the dropper above the ear. Place the prescribed number of drops into the ear. Do not put the dropper into the ear canal. It could injure the ear.

■ Stay in the same position for 3–5 minutes after using the drops. This will allow the eardrops to run down into the ear canal.

■ A gentle to-and-fro movement of the ear will sometimes help in getting the drops to their intended destination. You can also press with an in/out movement on the small piece of cartilage in front of the ear.

■ Dry the earlobe if there are any eardrops on it.

■ If you have had a wick placed in your ear, do not remove it. It may fall out on its own as the swelling and infection in the ear improves.

If you have to put drops in both ears:

Wait about 5–10 minutes before putting drops in the second ear. You want to be sure that the medicine stays in the ear canal of the first ear long enough to reach the eardrum before you tilt your head to put drops in the other ear.

These instructions may be changed by your healthcare provider depending on your medical condition or the type of medicine in the eardrops.

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