



Earache

- 1. Make the diagnosis of otitis media (OM) only after good visualization of the eardrum (i.e., wax must be removed), and when sufficient changes are present in the eardrum, such as bulging or distorted light reflex (i.e., not all red eardrums indicate OM).**

Acute otitis media is diagnosed in patients with acute onset, presence of middle ear effusion, physical evidence of middle ear inflammation, and symptoms such as pain, irritability, or fever. AOM is often a complication of eustachian tube dysfunction occurring during viral URTI, most commonly caused by streptococcus pneumoniae, haemophilus influenzae, moraxella catarrhalis.

AOM diagnosis requires:

CPS diagnostic criteria (2016) is:

- acute onset of otalgia or suspected otalgia, within 48 hours
- middle ear fluid, and
- significant inflammation of the middle ear (this sign differentiates from OME)

Otitis media with effusion is defined as a middle ear effusion in the absence of acute symptoms. Pneumatic otoscopy and tympanometry is a useful technique for the diagnosis of AOM and OME and is 70-90% sensitive and specific, whereas simple otoscopy is only 60-70% accurate.

An effusion is present when there is little or no mobility of the tympanic membrane when both positive and negative pressure is applied using a pneumatic otoscope (CPS).

We do recognize however that most offices do not have pneumatic otoscopes, so if you have the chance to use one - practice!

The poor man's version of pneumatic otoscopy is sucking in and blowing against a closed mouth and nose, which can move the tympanic membrane and mimic what you would see with a pneumatic otoscope.

Other signs you can use are:

- loss of bony landmarks behind the tympanic membrane and
- presence of air-fluid levels (or bubbles) behind it as well.

Inflammation with bulging tympanic membrane on otoscopy is highly suggestive of AOM, but OME tends to be less inflamed and less symptomatic

Acute otitis externa presents with similar symptoms to acute otitis media, including otalgia, itching, fullness, hearing loss, or ear canal pain when chewing.

An important distinguishing clinical sign according to CPS is tenderness of the tragus when pushed and of the pinna when pulled in AOE.

There may be signs of ear canal inflammation including diffuse ear canal edema, erythema, with or without otorrhea, regional lymphadenitis, tympanic membrane erythema, and cellulitis of pinna and adjacent skin.

As a refresher, the shownotes include an image from paediatrics with side by side of a normal tympanic membrane, and then varying degrees of bulge to help remind yourself what this looks like if it's been a while.

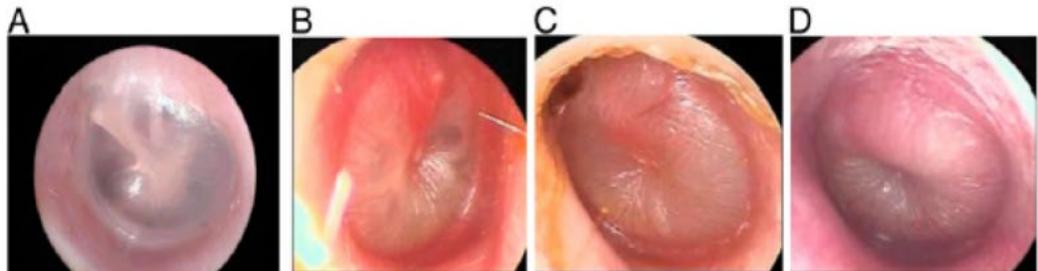
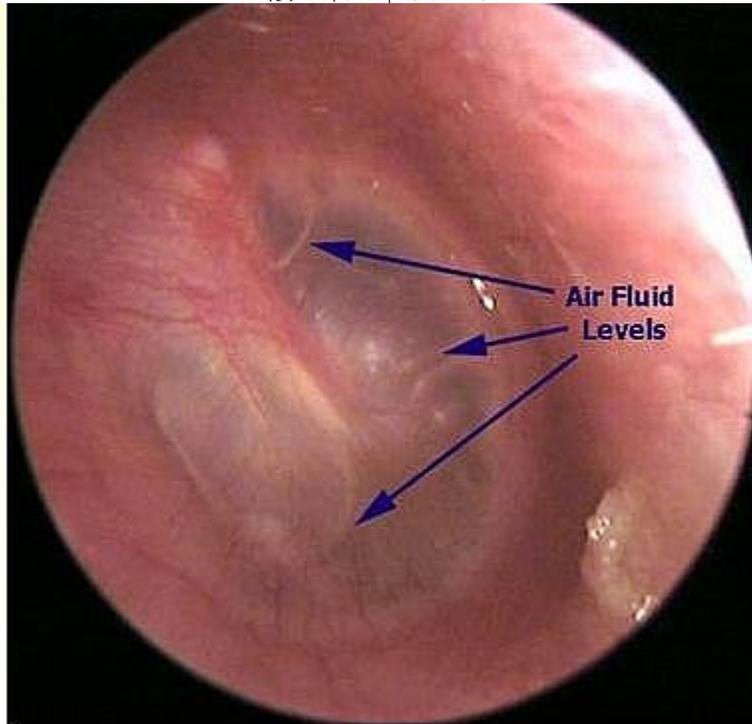


FIGURE 2

A, Normal TM. B, TM with mild bulging. C, TM with moderate bulging. D, TM with severe bulging. Courtesy of Alejandro Hoberman, MD.



2. Include pain referred from other sources in the differential diagnosis of an earache (eg. Tooth abscess, trigeminal Neuralgia, TMJ dysfunction, pharyngitis, etc.).

Referred ear pain from sources that are NOT the ear structures themselves is also known as secondary otalgia. UpToDate has a nice table on all the differential causes of ear pain including secondary otalgia.

We will list conditions to consider, but of course don't have sufficient time to go through each one. Take this as a prompt to read up on any you don't recall.

Secondary causes include:

- Pharyngitis
- Stomatitis
- dental infection
- auricular lymphadenopathy or lymphadenitis
- sinusitis (usually maxillary)
- Parotitis
- TMJ arthritis
- trigeminal neuralgia
- facial nerve palsy (AKA Bell's palsy)

- Psychogenic
- cervical spine injury

A thorough history of pain onset, location, associated features, and a thorough head, eyes, ears, neck and throat exam will help differentiate where the pain is originating and what is the likely cause.

- 3. Consider serious causes in the differential diagnosis of an earache (eg. tumors, temporal arteritis, mastoiditis).**



Temporal Arteritis:

which is usually characterised by temporal pain and tenderness, jaw claudication, scalp tenderness, and occasionally constitutional symptoms, can also present with otalgia. Patients may also have associated vision changes due to inflammation of the arteries in this area. About 50% of people with temporal arteritis also have polymyalgia rheumatica, so ask about pain and stiffness in the neck, shoulder and hips. The most common age group is over 60, usually 70 to 80 years old, and women are more commonly affected.



Meningitis:

is of course inflammation of the meninges, the protective membrane covering the brain and spinal cord. This can be a complication of untreated acute otitis media. Think about the possibility of meningitis in patients with headache, fever, and stiff neck. Unvaccinated children are of particular concern for meningitis if presenting with those symptoms.

Malignant otitis externa:

occurs when infection spreads from ear canal to the surrounding bones of the skull base. Very rare in pediatrics, but think about this in patients with intense or deep-seated ear pain, systemic signs of toxicity or fever, tenderness of temporal bone or facial nerve palsy.

Venous sinus thrombosis:

occurs when a blood clot form in the brain's venous sinuses. This can result as a complication from untreated acute otitis media and blood clots forming in transverse, lateral or sigmoid venous sinuses (CPS). Usually present with severe headache, often when patients lie down or lean forward due to increased intracranial pressure. It's unlikely patients with this condition will present with isolated ear pain, but beware if they also have vision changes, syncope or presyncope, seizures, or focal neurological symptoms.

Cholesteatoma:

is a rare but serious complication of chronic otitis media with effusion in which a benign mass of epithelial tissue develops behind the tympanic membrane. The issue arises because this tissue contains osteolytic enzymes and can erode into the bone of the ear canal.

Tumours:

are rare causes of otalgia but can present, including rhabdomyosarcoma of external auditory canal, lymphoma, eosinophilic granulomatous mass. Patients with relapsing or persistent cases of otitis externa or perforated otitis media should be evaluated for possible tumour in ear canal with CT head.

- 4. In the treatment of otitis media, explore the possibility of not giving antibiotics, thereby limiting their use (e.g., through proper patient selection and patient education because most otitis Media is of viral origin), and by ensuring good follow-up (e.g., reassessment in 48 hours).**

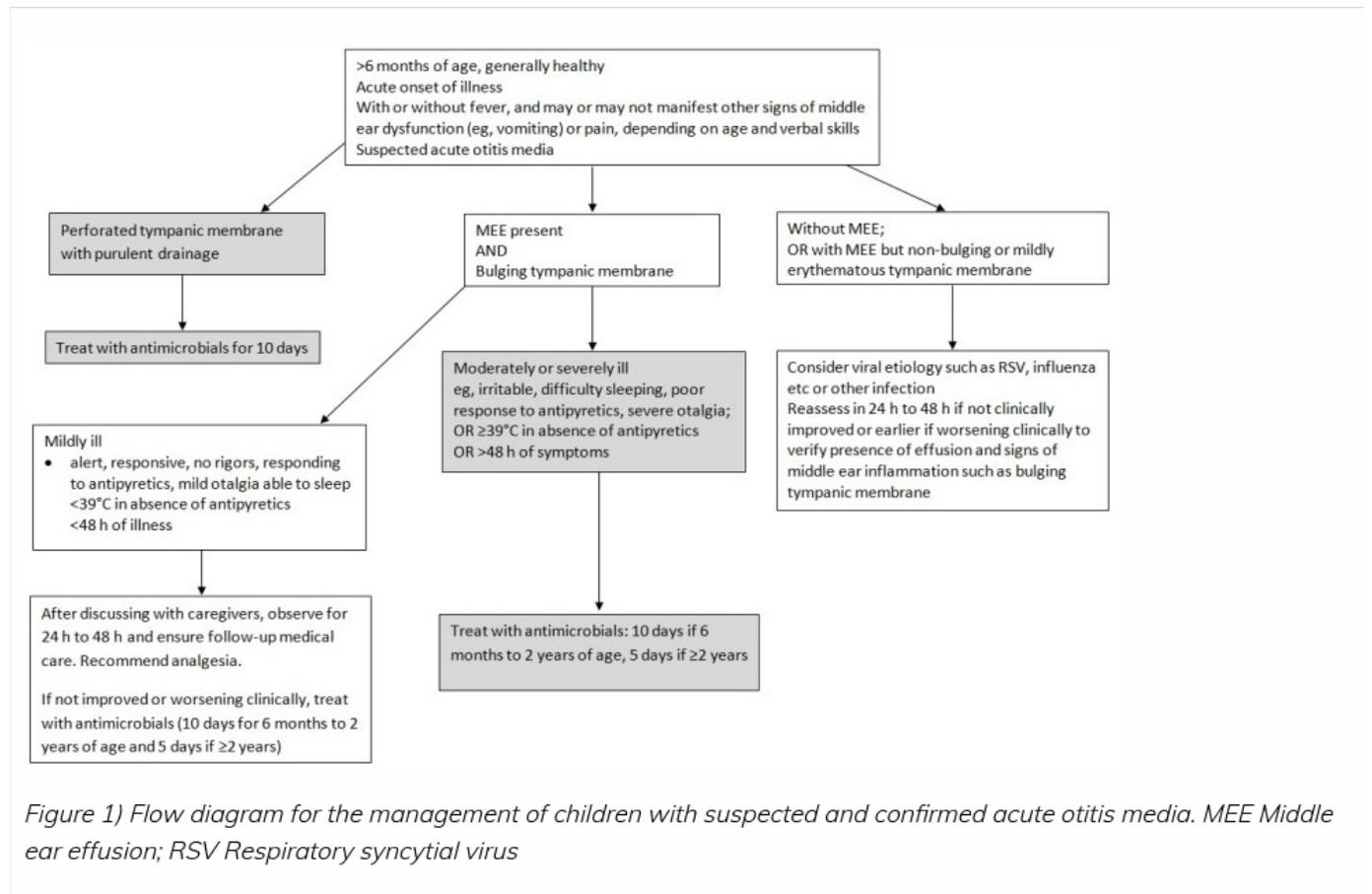
In patients without middle ear effusion, otorrhea, inflammation, fever, or pain lasting for greater than 48h, it is very reasonable to ask patients or parents to watch and wait for resolution of symptoms within 48 hours.

It is also appropriate to treat conservatively in the cases of kids 6 months and older with mild symptoms and unilateral AOM or kids over 2 years old with mild symptoms and bilateral AOM. They should be reassessed in about 2 days to see if clinical exam has changed.

Another option is to give a prescription to be filled by the patient or their parent if there is no symptomatic improvement in 48h.

Parents are often difficult to convince that their child does not need and should not take antibiotics, this is an art in and of itself to convince parents it's ok to treat conservatively. The key is follow-up!

You also may have a number of adult patients that similarly would rather have an antibiotic prescription, even though this isn't indicated. Try and get to the bottom of why they feel they need antibiotics, do some teaching around antibiotic resistance and discuss follow-up options.





5. Make rational drug choices when selecting antibiotic therapy for the treatment of otitis media. (Use first-line agents unless given a specific indication not to).

Because otitis media is almost always seen in kids, that is what we're covering here. Just know that for adults, you're more likely to treat AOM rather than wait, and there might be slight difference in antibiotic selection.

In kids, especially those 6 months or older with:

- otorrhea or a perforated tympanic membrane,
- moderate or severe otalgia,
- otalgia lasting for at least 48h, or
- temperature about 39 degrees,

should receive first-line systemic therapy for initial antibiotic treatment:

- Amoxicillin 45-60mg/kg/day in 3 divided doses or
- 75-90 mg/kg/day in 2 divided doses for
 - 10 days in children <2yo or
 - 5 days for children older ≥2 years of age and adults

The CPS mentions that penicillins susceptibility rate of *S pneumoniae*, which can cause invasive disease and is the predominant pathogen in AOM, is >90% in most areas in Canada

- Because amoxicillin covers both *S pneumoniae* and also group A strep, as well as some strains of *M catarrhalis* and *hemophilus influenzae*, this is why it's the drug of choice
- If the patient has a history of hypersensitivity reaction to amoxicillin or penicillin, using second-generation cephalosporins cefuroxime-axetil 30mg/kg/day 2-3 divided doses / day, or cefprozil, or a 3rd gen cephalosporin is acceptable. Alternatively you can use clarithromycin or azithromycin

Symptoms should improve within 24h and resolve within 2-3 days of starting antimicrobials; if persistent or worsening symptoms the patient should be evaluated again for persistent AOM or complications

Bugs & Drugs has a good chart about different situations and which antibiotics to use, including when to use low dose vs. high dose amoxicillin. They state:

- low/standard dose is 40 mg/kg/d PO divided TID and that high dose is 90 mg/kg/d PO divided BID-TID.
- High dose amoxicillin should be used if recurrent (≥3 episodes in 6 mos or ≥4 episodes in 12 months with at least 1 in the last 6 mos), as long as is greater than 6 weeks since the last bout.
 - If it is less than 6 weeks since last bout of AOM, this is considered a failure of first line agents. High dose can also be considered for healthy children ≥6 mos.



6. In patients with earache (especially those with otitis media), recommend appropriate pain control (oral analgesics).

Analgesics are recommended for symptoms of ear pain, fever and irritability associated with earache, and are particularly important at bedtime because disrupted sleep is one of the most common symptoms motivating parents to seek care.

Ibuprofen is preferred given its longer duration of action and its lower toxicity in the event of overdose.

Tylenol can be used and is very effective as an anti-pyretic. Remember to explain to patients and parents that both can *and should be* used together for earaches.

7. In a child with a fever and a red eardrum, look for other possible causes of the fever (i.e., do not assume that the red ear is causing the fever).*

Normally the tympanic membrane is slightly grey in colour, however it can become red due to crying or infection (CPS). Because acute otitis externa have similar symptoms to acute otitis media, look at the external canal thoroughly for signs of canal inflammation.

Of course then if your paediatric patient has a fever, and a red tympanic membrane that could just be because they're angry and crying, you need to open up your differential for the child with a fever again. URTI? PNA? Meningitis? UTI? And on and on. Point is, don't have your hat on a red tympanic membrane as a source of your patient's fever.

8. Test children with recurrent ear infections for hearing loss.

Children with otitis media with effusion persisting for ≥ 3 months after AOM should get a hearing test.

Hearing loss that persists 1-2 weeks after resolution of infection and effusion need audiometry and ENT consult.

Consider ENT referral if hearing loss ≥ 40 dB. Otitis media with effusion is common. Up to 40% of children will have an effusion 1 month post AOM.

Some Sources Used

- <https://cps.ca/en/documents/position/acute-otitis-media>
- <https://cps.ca/en/documents/position/acute-otitis-externa>