

Hearing Loss in Otolaryngology for Internists

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ABSTRACT:

A focused history and the corresponding time course help internists distinguish between diseases that appear with hearing loss. A complete otologic history and physical, including an otoscopy, a facial nerve exam, and a tuning fork test, should be performed on every patient who complains of hearing loss. Sudden sensorineural hearing loss is the most serious type of hearing loss and requires immediate treatment with oral steroids and/or intratympanic steroid injection. It also requires audiometry and referral to an otolaryngologist. Age-related hearing loss is very common, and mounting research shows that it has significant effects on healthy ageing. There is a demand for accessible, affordable hearing care, and more options are now available to older people thanks to recent national initiatives and federal legislation.

Keywords: Hearing loss, Age-related hearing loss, Hearing health, Hearing health care, Hearing aids, Over-the-counter hearing aids, Older adults.

INTRODUCTION:

More than 60 million Americans suffer from hearing loss, the third most frequent chronic illness. ^{1,2} Although age-related hearing loss is the most frequent cause of hearing loss, an internist must distinguish between a number of etiologies and presentations to choose the best course of action and whom to refer. Given the frequency of age-related hearing loss, this article discusses typical acute and chronic hearing loss presentations and offers a primer on age-related hearing loss, including useful therapy strategies.

ACUTE HEARING LOSS:

Symptoms: Hearing loss can range in severity from minor to profound and can be unilateral or bilateral. Indicators of hearing loss include a sense of auditory fullness and symptoms like tinnitus, vertigo, otalgia, or otorrhea, depending on how severe it is. The history should contain information about the symptoms' start (i.e., sudden vs. gradual), laterality, severity,

durability (i.e., fluctuating vs. constant), and related symptoms. The differential diagnosis will also be influenced by previous hearing loss, prior ear surgery, and personal and family history.

Diagnostic Tests: An otologic history, which includes otoscopy, a facial nerve examination, and a tuning fork test, should be combined with an otologic physical examination to help distinguish between prevalent causes of acute hearing loss. Bilaterally, the pinna should be carefully examined, and the external auditory canal and tympanic membrane should be viewed with an otoscope. Make a note of any ear canal lesions after inserting the speculum. By using the widest speculum feasible and pulling the superior aspect of the pinna superiorly and laterally to straighten the ear canal, it is best to examine as much of the tympanic membrane as possible.

Audiometry is the main component of hearing loss diagnostic examinations. The gold standard in the diagnosis of hearing loss continues to be audiograms, which are normally conducted by audiologists in a soundproof booth. Conduction and sensorineural hearing loss are distinguished by audiometry, along with their severity. Even while getting an audiogram on the weekends or after hours can be challenging, there are mobile options that have been proven to be just as accurate as conventional audiometry. [3–6] A number of smartphone applications use the patient's earbuds to do a hearing screening that measures thresholds across a spectrum of frequencies. These applications can roughly estimate hearing thresholds and provide information about beginning therapy. [3–6]

Differential Diagnosis and Associated Management

Cerumen impaction: The external auditory canal is shielded by the hydrophobic and bacteriostatic properties of cerumen, and cerumen is removed from the ear canal through lateral epithelial migration, making the ear canal "self-cleaning." [7,8] However, cerumen can get impacted and manifest with an acute or gradual alteration in hearing based on individual variances in cerumen quality and quantity as well as use of cotton swabs. Patients frequently have a history of using cotton swabs or other foreign objects, and they may also complain of pruritus and auditory fullness. Patients need to be warned not to put anything in their ear canals, even cotton swabs. Physical examination is used to make the diagnosis when cerumen either totally or partially obscures the view of the tympanic membrane. As a first line of treatment, cerumen removal with an operating otoscope or topical cerumenolytics may be employed. Referral to an otolaryngologist for cerumen removal and microscopic inspection is advised if the impaction continues. Following cerumen removal, if the patient experiences an improvement in hearing, additional diagnostic testing, such as audiometry, is typically not necessary. Patients may also receive advice on preventative actions, such as refraining from using cotton swabs and regularly using emollients like mineral oil. [9]

Otitis externa: Otalgia, pruritus, and purulent otorrhea are the main symptoms of acute otitis externa (AOE), although the disorder may also be accompanied by hearing loss due to ear

canal edoema. [10] The ear canal has been manipulated by the patient in the past, possibly with cotton swabs or other foreign items. [10] AOE typically affects swimmers during the summer when the warm, wet ear canals are ideal for bacterial development. A thorough history must be taken, especially when it comes to comorbidities like diabetes and immune system problems, which have an impact on treatment. An erythematous and edematous ear canal, a manipulable pinna, and purulent discharge are all physical examination findings. [10] The otoscopic view of the tympanic membrane is frequently constrained by otorrhea and/or canal edoema. As a bacterial infection most frequently brought on by *Pseudomonas aeruginosa* and *Staphylococcus aureus*, topical antiseptic eardrops containing acetic acid and a steroid, such as hydrocortisone, or antibiotic eardrops with steroids, are the first-line treatments. [11] Commonly prescribed eardrops with a ciprofloxacin base and steroids are used twice daily for 7 to 10 days. [11] The most crucial treatments are topically applied, and for drops to work properly, the ear canal must receive enough delivery. To guarantee adequate delivery of topical therapies, a wick can be required if the patient has substantial ear canal edoema. [11] Pain management should be discussed and provided because AOE is painful. Although systemic antibiotic treatments are not the first line of treatment for AOE, they may be required if the patient has diabetes, an immune disorder, the edoema and erythema associated with the condition have significantly spread outside of the ear, or topical medications have failed to stop the disease's progression. [11] Systematic antibiotics should treat *P aeruginosa* and *S aureus* similarly to topical medications. Regular ear canal debridement is usually required with the edoema and otorrhea linked to AOE to facilitate recovery. If symptoms worsen or persist after receiving initial treatment that is effective, or if considerable debris or purulence prevents topical eardrops from working well and debridement and/or wick placement are required, it is advisable to consider referring the patient to an otolaryngologist.

Malignant otitis externa, an AOE consequence and potentially fatal infection that affects the external auditory canal bone and the surrounding skull base in addition to the soft tissue of the ear canal, is possible during particularly severe or protracted bouts of AOE. [10,12] All cases of AOE in individuals with these conditions—who are typically immunocompromised and diabetic—must be treated and continuously watched for improvement. When severe otalgia is present for four weeks or longer, associated with purulent otorrhea, and occasionally cranial neuropathies, including facial paresis or paralysis, malignant otitis externa can be distinguished from AOE. [10,12] The presence of granulation tissue throughout the ear canal's floor is the key examination finding. An accelerated referral to an otolaryngologist is required due to the need for intravenous antibiotics, optimum therapy of the underlying immunosuppression, and suspicion of malignant otitis externa.

Herpes zoster oticus

Hearing loss that is accompanied by otalgia and a vesicular rash in the canal can be a sign of herpes zoster oticus. [12] Ramsay Hunt syndrome is the name given to the disorder when

these symptoms are also accompanied by facial paralysis. [12] To distinguish this syndrome from AOE and sudden sensorineural hearing loss, a careful examination of the ear canal to spot the distinctive vesicular rash of herpes zoster and the cranial nerves to spot partial or complete facial weakness are crucial. The virus can be isolated from vesicular fluid to confirm the diagnosis. [13] Once a condition has been identified, prompt treatment with oral steroids (prednisone 60 mg daily for 3-5 days) and antivirals (famciclovir 500 mg three times a day for seven days or acyclovir 800 mg five times a day for seven to ten days) is essential, as well as an urgent referral to an otolaryngologist. [14,15]

Acute otitis media

Adults can have acute otitis media, but it is considerably less prevalent than in children. Otitis media frequently develops in individuals who have allergic rhinitis or an upper respiratory tract infection. [16] Otolgia and impaired hearing are the patient's initial symptoms, especially if an effusion is present. Tympanic membrane is commonly erythematous and swollen with effusion when examined. Pain when manipulating the pinna or edoema and erythema of the external auditory canal are distinguishing signs of AOE but are not present in otitis media, which helps to distinguish it from otitis externa.

Amoxicillin 500 mg three times daily for 7 to 10 days is the recommended course of treatment for uncomplicated otitis media, whereas patients with diabetes or impaired immune systems should take amoxicillin/clavulanate 875 mg twice daily or 500 mg three times daily for 10 to 14 days. [17] When a patient is sent to an otolaryngologist, a myringotomy can be performed in the doctor's office, which would immediately relieve the patient's otalgia and hearing loss while also evacuating the effusion. 16 Patients should be referred to an otolaryngologist for a nasopharynx examination if an effusion persists for longer than 8 weeks, especially if it is unilateral. [18,19]

Meniere disease

Although episodic rotational vertigo that lasts for up to hours at a time is the main symptom of Meniere disease, or endolymphatic hydrops, patients might also have fluctuating low-frequency hearing loss, auditory fullness, and tinnitus. [20,21]

Although symptoms are typically unilateral, they can eventually develop in the opposite ear. The patient typically experiences varying symptoms at first, including recurring attacks, but eventually "burns out," and the hearing loss may become permanent. [20,21] Based on the clinical history and audiometry, Meniere illness can be distinguished primarily. Patients who experience sudden hearing loss, such as during an assault, should be sent to an otolaryngologist and evaluated right away.

Sudden sensorineural hearing loss

Sudden sensorineural hearing loss (SSNHL), one of the rare disorders that can cause an acute change in hearing, necessitates urgent care and referral to an otolaryngologist. Patients typically experience acute or gradual unilateral hearing loss that lasts between one and three days when they first appear. [22,23] Hearing loss is defined as a decline in hearing thresholds of at least 30 dB across three frequencies, whether it be partial or total. [22,23] Patients frequently describe auditory fullness, sometimes a momentary sense of instability or vertigo, and they could even discover that they can't hear out of one ear when chatting on the phone. [22,23] It can take longer to receive treatment since SSNHL is frequently misdiagnosed as acute otitis media, Eustachian tube dysfunction, and otitis media with effusion. The main physical examination and history findings to distinguish SSNHL from acute otitis media and Eustachian tube dysfunction with effusion are summarised. When a formal audiogram would not be available after hours or on the weekend, mobile smartphone applications can also help in estimating the patient's hearing in addition to a tuning fork test.

This preliminary hearing test should not take the place of a full audiogram, but it can help guide beginning care. Although the precise cause of SSNHL is unknown, it may be brought on by a vascular aetiology, tumour, or viral infection. No matter what, any potential SSNHL loss must to be addressed right away. An key outcome predictor is the length of the treatment. It is important to refer you to an otolaryngologist for audiometry, additional assessment, and treatment. As soon as feasible, treatment with oral steroids (prednisone 1 mg/kg per day for 14–21 days with taper) should start. [22] In addition to administering oral steroids, the otolaryngologist can administer intratympanic steroid injections into the middle ear as a primary therapy option for patients who are unable to take a lengthy course of oral steroids. [22]

CHRONIC HEARING LOSS:

Symptoms: Patients may find it challenging to understand their hearing condition because hearing loss can develop gradually over months or years. Hearing loss is one of the causes of gradual hearing loss that normally progresses over time, starting out as a minor loss and getting worse. Finding out whether the hearing loss is unilateral or bilateral is crucial because unilateral progressive hearing loss frequently signifies a greater underlying condition than bilateral age-related hearing loss. Aural fullness can be a symptom in patients whose hearing has gradually deteriorated. Tinnitus is also frequent, particularly when the hearing loss has been present for a long time. When there is gradual hearing loss, vertigo, disorientation, and otorrhea are problematic symptoms because they suggest anything other than age-related hearing loss. A thorough personal and family otologic history should be gathered, including information about ear surgeries, noise exposure, occupation, leisure activities, and ototoxic drugs.

Diagnostic Tests: Start with an otologic history and physical examination, which includes otoscopy, a tuning fork examination, and a facial nerve evaluation, much like with an acute hearing loss. The majority of the time, the results of the ear examination will be normal; however, a thorough examination of the tympanic membrane to look for keratin debris and/or retraction may reveal the presence of a cholesteatoma or chronic otitis media, which necessitates additional testing and care from an otolaryngologist. It is crucial to receive an audiogram, which can be done either by going through an otolaryngologist or an audiologist.

Differential Diagnosis and Associated Management

Chronic otitis media and cholesteatoma: Chronic otitis media and associated cholesteatoma may be present in patients who have a long history of hearing loss, ear infections as a kid, and/or many sets of tympanostomy tubes. [24,25] Depending on the structures implicated, patients frequently come with a history of purulent otorrhea along with hearing loss, tinnitus, vertigo, and/or facial nerve palsy. Patients may exhibit retraction of the tympanic membrane, white skin-like debris, polypoid granulation tissue, and/or purulent discharge during a physical examination. Patients should be sent to an otolaryngologist for additional assessment and care.

Autoimmune inner ear disease: Numerous systemic autoimmune diseases, such as systemic lupus erythematosus, inflammatory bowel disease, ulcerative colitis, Crohn disease, polyarteritis nodosum, and granulomatosis with polyangiitis, can also affect hearing and mirror disease progression, resulting in a progressive or fluctuating, bilateral hearing loss. [26]

Vestibular schwannoma: A tiny benign tumour of the vestibular nerve may be present in patients with unilateral hearing loss who do not have a history of trauma or previous otologic surgery (cranial nerve VIII). The resulting hearing loss typically affects higher frequencies and advances slowly. However, SSNHL can be present in up to 25% of patients with vestibular schwannomas. [27]

The majority of patients also have tinnitus, vertigo or a feeling of being off balance, and facial paresis or paralysis. The tympanic membrane will be healthy on physical examination, however there may be subclinical facial weakness or asymmetry. Patients who experience unilateral hearing loss are advised to get an audiogram and be sent to an otolaryngologist.

Noise-induced hearing loss: Following exposure to acoustic trauma, such as a brief but powerful noise, patients may present with an abrupt alteration in hearing that may be temporary or permanent. [27] Patients who have a history of chronic noise exposure and slowly progressing hearing loss are more likely to present. Typically, patients will undergo a routine otoscopic examination. An audiogram should be done on the patient, and an otolaryngologist should be consulted. Despite the possibility that patients will benefit from

hearing aids, prevention is essential. This includes limiting exposure and regularly using earplugs and other hearing protective devices.

AGE-RELATED HEARING LOSS:

Epidemiology: Age-related hearing loss affects 23 million older Americans, with rates of clinically severe hearing loss nearly doubling with each decade of life. [2,28,29] Age-related hearing loss is more common in men than in women and among people with fairer skin colours (lower Fitzpatrick skin types) compared to those with darker skin colours (higher Fitzpatrick skin types), which is thought to be related to variations in the density of protective strial melanocytes in the cochlea. [29–32] Age-related hearing loss has not been consistently and significantly linked to cardiovascular risk factors like smoking, diabetes, stroke, or hypertension. [29]

Implications on Aging: Age-related hearing loss may have significant effects on the ageing process, according to mounting data. The chance of developing dementia increases with the severity of hearing loss, which is independently linked to both incident dementia and rapid cognitive decline. [33–44] Age-related hearing loss is the most potentially modifiable risk factor for dementia given its prevalence and level of risk. [33] In addition to functional restrictions and falls, age-related hearing loss has also been independently linked to depressive symptoms, anxiety, and loneliness. [45–55]

Treatment

Barriers to care and disparities: There are many obstacles to receiving proper hearing healthcare, including systemic and individual-level issues. The United States' clinic-based hearing health care system traditionally necessitates numerous visits to various clinicians and fee-for-service appointments that are not covered by Medicare. [56,57] Only 15% to 20% of older persons with hearing loss utilise hearing aids, and there are care inequities based on socioeconomic status, race, and ethnicity. [58–61]

Recent advances in hearing health care: Major advancements in improving the affordability and accessibility of hearing care have resulted from national efforts by leading organisations, led by the White House President's Council of Advisors on Science and Technology and the National Academies of Sciences, Engineering, and Medicine. [57,62,63] As a result of these initiatives, a bipartisan measure that required the Food and Drug Administration (FDA) to establish a new regulatory classification for over-the-counter hearing aids within three years was signed into law in August 2017. [64,65]

Hearing Aids

Key components of technology: The current gold standard in hearing care is hearing aids. The most fundamental hearing aid consists of three parts:

1. A microphone for recording ambient noise
2. A sound-processing and sound-manipulating amplifier
3. A sound-delivery receiver for the wearer's ears [66]

Hearing assistive technologies: Hearing assistive technologies enhance the effectiveness of hearing aids in particular contexts.[67] Bluetooth can be used by streaming devices that are worn as a necklace or a lapel clip to transmit a direct signal from mobile phones to hearing aids. At order to send a direct signal to a patient's hearing aids, remote microphones can be positioned by a signal of interest, such as a fellow diner in a restaurant or the podium during a lecture. [68] The wearer's hearing aids can be connected to televisions and radios in the home via streaming devices. For senior people who cannot operate the tiny buttons on the hearing aids manually, remote controllers are available to regulate hearing aid volume and programmes.

Fitting and aural rehabilitation: The patient's hearing loss and way of life are taken into account when designing programmes and adjusting hearing aids to prescribed amplification targets. The counselling and communication techniques that go along with hearing aid fitting are equally vital to the hearing aid itself. Patients receive instruction on how to use their device, such as changing batteries, and communication tactics, including reducing background noise, which are frequently referred to as aural rehabilitation.

Over-the-counter options: For certain individuals, personal sound amplification products (PSAPs) could be an accessible and reasonably priced solution. Although PSAPs are not sold for hearing loss since they are not regulated by the FDA, current study indicates that some of them may function similarly to hearing aids in terms of technology and enhance speech understanding. [70,71] There are ear-level and portable devices. Patients who struggle with manual dexterity or who suffer from cognitive impairment may benefit more from handheld gadgets. [72] Lists factors to take into account when purchasing a PSAP given the significant level of variation in the PSAP market. [70] Recent legislation, which was previously discussed, would further restrict this industry by requiring the FDA to regulate an over-the-counter class of hearing aids for mild to moderate hearing loss by the year 2020. [64]

Cochlear Implants: Age-related hearing loss is gradual, and cochlear implantation may be an option for older persons who have severe to profound hearing loss and no longer benefit from hearing aids. [73,74] Adults, especially nonagenarians and octogenarians, frequently undergo cochlear implantation, an outpatient operation that has benefits for both younger and older patients. [75] Cochlear implantation is covered by Medicare and the majority of private health insurance, unlike hearing aids. Older seniors and all patients with bilateral severe to profound hearing loss should be referred for examination to an otolaryngologist who conducts cochlear implants.

CONCLUSION:

Numerous disorders that need for initial assessment and otologic screening include those that cause hearing loss both immediately and over time. Although the majority of hearing loss reasons can be treated initially in a general care setting, some cases, like abrupt hearing loss, demand immediate attention and referral. Age-related hearing loss, however, is the most typical reason for hearing loss. With the right education and counselling, inexpensive and accessible choices can be provided in an outpatient and direct-to-consumer setting with the current advancements in technology and legislation improvements.

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