

Diagnosis and management of hearing loss in elderly patients



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Background

Hearing loss is the most common sensory deficit in elderly patients, and is often under-recognised and poorly managed. It is essential for all clinicians to have awareness and knowledge in this field to enable the institution of early and appropriate care.

Objective

The goal of this article is to review the causes, diagnosis and management of hearing loss as it applies to elderly patients. The review describes a useful approach that clinicians can apply to daily practice.

Discussion

For elderly patients presenting with hearing loss, the basic assessment should include history, physical examination and pure tone audiometry. Management depends on the cause and type of hearing loss, and options include medical therapy, surgery and amplification. In the absence of a simple and correctable cause, consider referring patients to an otolaryngologist for further assessment.

Hearing loss is the most common sensory deficit in elderly patients.¹ It affects 37% of adults aged 61–70 years, and more than 80% of those older than 85 years of age.² In elderly patients, the consequences of hearing loss are substantial and include social withdrawal and isolation, functional decline with increased risk of falls and depression, and poor quality of life.³ Despite this, hearing loss is often under-recognised and poorly managed,² possibly because of the common belief that it is a part of normal ageing. Poor management results from a lack of knowledge and appreciation for hearing enhancement options, including an increasing array of implantable hearing devices that offer benefits above those of standard hearing aids. The aim of this article is to present the current evidence regarding the diagnostic process and management options for hearing loss as it applies to elderly patients.

Case 1

Mrs CL, 75 years of age, presents with a six-month history of confusion, functional decline and falls for assessment. She lives with her husband and was previously independent in activities of daily living. Her medical history is significant for hypertension, type 2 diabetes mellitus, hyperlipidaemia and chronic obstructive pulmonary disease.

Case 2

Mr XY, 80 years of age, has come to see you with his wife. She is concerned about his hearing and reports that he often increases the television volume and chooses subtitles for greater comprehension. He is also having difficulty following conversations and understanding speech. His medical history is significant for hypertension, which is well controlled by perindopril.

Clinical presentation

For elderly patients presenting with hearing loss, it is important to first identify:

- the progression of the loss
- whether it is unilateral or bilateral in nature
- whether there are associated symptoms such as tinnitus or vertigo.⁴

Patients should also be asked about a history of chronic otalgic infections, previous otalgic surgery and chronic exposure to traumatic levels of noise.⁴ Chronic medical conditions such as atherosclerosis, diabetes and kidney disease are also important to note, as well as the use of ototoxic medications such as loop diuretics, aminoglycoside antibiotics and cisplatin chemotherapeutic agents.⁴

Physical examination

A physical examination with attention to the anatomical structures of the ear and aided by otoscopy is essential. The external auditory canal (EAC) should be examined for obstruction by cerumen or a foreign body, and for evidence of inflammation and infection, which could be suggestive of otitis externa.⁴ The tympanic membrane (TM) should be examined for integrity, translucency and mobility to assess the presence of any middle ear disease.⁴ Tuning fork tests should be used to help differentiate between conductive hearing loss (CHL) and sensorineural hearing loss (SNHL).^{4,5}

In the absence of a simple and correctable cause for hearing loss, consider referring the patient to an audiologist and/or otolaryngologist for further investigation with audiometry and imaging.

Audiometry and imaging

Pure tone audiometry is used to assess hearing loss in adult patients. It allows for independent thresholds to be determined in each ear, for air conduction (conductive hearing) and bone conduction (sensorineural hearing).⁶ Air conduction measures the ability of the external and middle ear to transmit sound to the cochlea. CHL results from any barriers that inhibit sound transmission along this pathway, which may include cerumen impaction, middle ear fluid or a TM perforation. On the audiogram, CHL is depicted as an air-bone gap. SNHL is defined by equal air and bone conduction thresholds higher than 25 Db. Tympanometry can complement the pure tone audiogram by assessing the compliance and mobility of the middle ear system.

In addition, a test of the patient's ability to understand spoken words can be performed. In the speech discrimination test, a patient is presented with a range of phonetically balanced words.⁶ The result of this test, the speech discrimination score, should be between 90 and 100% for 'normal' speech discrimination. The patient's ability to understand speech is very important, particularly if assessing whether a hearing aid will be beneficial. For patients with very poor speech discrimination, amplifying garbled speech with the use of hearing aids has very limited benefits. Instead, these patients may benefit from implantable hearing devices and can be referred to an otolaryngologist.

To further investigate the cause of hearing loss, computed tomography (CT) and gadolinium-enhanced magnetic resonance imaging (MRI) may be used.⁴ CT of the temporal bones can identify structural abnormalities such as atresia, chronic otitis media and cholesteatomas. Gadolinium-enhanced MRI can identify retrocochlear pathologies such as acoustic neuromas and cochlear nerve agenesis.

CHL and SNHL

As previously discussed, CHL results from any barriers that inhibit sound transmission from the external and middle ear to the cochlea. Most causes of CHL can be medically or surgically corrected.⁶ Diseases of the EAC, such as otitis externa, can be treated with topical antibiotics or antifungal agents. Cerumen impaction can be removed by irrigation or ear toileting performed under the microscope. Middle ear fluid can be managed with antibiotics or by insertion of myringotomy tubes. TM perforations and cholesteatomas can be managed surgically.

SNHL is more common in elderly patients.⁶ There are many causes of SNHL, but age-related changes to the cochlea, known as presbycusis, are the most common cause.⁶ Presbycusis occurs when the outer hair cells within the cochlea gradually deteriorate with age and causes a symmetrical SNHL that is apparent at the high frequencies. Other causes for SNHL include acoustic trauma or chronic exposure to traumatic levels of noise.^{5,6}

Recreational shooting, use of firearms and loud noise can cause a characteristic type of SNHL whereby on the audiogram, there is a symmetrical 'noise notch' in air conduction thresholds at around 4000 Hz. Although often symmetrical, noise-induced hearing loss may be unilateral.

Patients with asymmetric SNHL require further investigation to exclude retrocochlear pathologies such as acoustic neuromas.^{5,6} These patients tend to report tinnitus and dysequilibrium, and have poor speech discrimination in the affected ear. Gadolinium-enhanced MRI is the diagnostic test of choice for acoustic neuromas.

Sudden SNHL is characterised by a rapid deterioration in hearing over the course of seconds to days.⁷ Most cases are unilateral in nature and bilateral involvement is rare. Suspected causes of sudden SNHL include:

- infections
- primary otologic disease of the temporal bone
- inner ear trauma
- vascular insufficiency
- neoplastic disease.

Sudden SNHL is an otologic emergency and treatment with corticosteroids should be initiated as soon as possible to improve the chances of hearing recovery. These patients require an urgent referral to an otolaryngologist for assessment, audiometry and MRI.

Management options

Management of hearing loss depends on the cause and type of loss. The options include medical therapy, surgery and amplification.^{4,5} For hearing loss secondary to infectious or systemic aetiologies, medical therapy in the form of antibiotics or steroids may be used. Surgery may be performed as a reparative procedure.

Assistive hearing devices and amplification are the mainstay for managing hearing loss.^{4,5} Patients with any degree of hearing loss have the potential for benefit. Hearing aid parameters are based on prescriptive algorithms using audiological test information, and clinicians match device recommendations on the basis of the patient's need and preference. Behind-the-ear, in-the-ear, in-the-canal and completely-in-the-canal hearing aids differ in size, placement and degree of amplification. Hearing aid technology has improved dramatically over the past few years and hearing aids are now smaller, more comfortable and capable of producing more natural sound with less extraneous noise.

Compared with unassisted adults who are hearing-impaired, users of hearing aids experience less depression and social isolation, and have better cognition, communication and relationships.¹ Barriers to obtaining and using hearing aids are cost, negative stereotypes and limited dexterity to insert, remove and clean the device.⁴ The cost of adult hearing aids can be subsidised either by Medicare for all patients with a disability or pension card or by private health insurance. For the latter, it is important to check the level of private health cover the patient has, as some providers may cover only a small part of the costs.

For patients with a CHL who have difficulty using hearing aids, or for patients with a unilateral SNHL, bone-anchored hearing aids (BAHA) or middle ear implants (MEI) may be an option.^{4,5} The BAHA device is attached to the mastoid bone by an osseointegrated titanium screw and allows for sound to be transmitted directly through the skull and to the cochlea, therefore bypassing the damaged outer and/or middle ear. The MEI is attached to the middle ear bones and allows for sound to be transmitted directly to these structures. Currently, access to BAHA and MEI devices is covered only through private health insurance; however, patients with a concession or pension card may be eligible for some funding through Australian Hearing.

For patients who no longer benefit from hearing aids because of the severity of their thresholds and/or poor speech discrimination ability, cochlear implants may be an option.^{4,5} A cochlear implant consists of an internal cochlear electrode array with a receiver, external speech processor and transmitter. The external processor receives sound and converts it into electrical impulses that are sent to the receiver and routed to multiple electrodes within the cochlea. Electrical impulses reaching the cochlea depolarise the cochlear nerve fibres to initiate the perception of sound. The cost of a cochlear implant is subsidised by Medicare for eligible patients or by private health insurance.

Current evidence from the literature shows that the success of cochlear implants is not age-related.^{8,9} Elderly patients with

a cochlear implant have been shown to benefit from improved cognition, psychological health and quality of life. The rate of surgical complications is low, with no reported difference between older and younger patients, even with patients older than 80 years of age at the time of implantation. Advanced age is not a contraindication for a cochlear implant; therefore, consider referring patients to an otolaryngologist for an assessment.

Case 1 (continued)

As part of her assessment, Mrs CL was checked for hearing loss. On physical examination, the EAC and TM were normal. Pure tone audiometry revealed symmetrical, moderate-to-severe SNHL apparent at high frequencies, consistent with presbycusis. Mrs CL's speech discrimination score was 95%. She was referred to Australian Hearing for a trial of hearing aids, which significantly improved her cognition, function and ability to live independently.

Case 2 (continued)

On physical examination of Mr XY, his EAC and TM were normal. Pure tone audiometry revealed severe SNHL in the left ear and mild-to-moderate SNHL in the right ear. His speech discrimination score was 45%. Given that Mr XY had asymmetric SNHL, he was further investigated with a gadolinium-enhanced MRI, which did not show any retrocochlear pathology. He was referred to Australian Hearing for a trial of hearing aids but his hearing did not improve and his speech perception remained poor. Consequently, Mr XY was referred to an otolaryngologist for an assessment and received a left cochlear implant, which significantly improved his hearing, comprehension and quality of life (Figure 1).



Figure 1. Mr XY fitted with a cochlear implant

Conclusion

Elderly patients presenting with confusion, functional decline, immobility and falls should be assessed for hearing loss and considered for referral to an audiologist and/or otolaryngologist. It is essential for clinicians to have an increased awareness and knowledge in this field to enable institution of early and appropriate care.

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