

Hearing aid amplification and tinnitus: 2011 overview

By Douglas L. Beck, AuD

Some 50 million people in the United States have tinnitus.¹ Although no one knows the exact numbers, Henry, Dennis, and Schechter² suggest perhaps ten to twenty percent of tinnitus patients manifest a “clinically significant condition,” and the average tinnitus patient waits more than six years between tinnitus onset and seeking relief.³ Tinnitus is associated with virtually every otologic disorder and the majority of tinnitus patients have sensorineural hearing loss.^{4,5}

A differential diagnosis regarding the etiology of tinnitus for each patient, derived via a multi-disciplinary team prior to treatment, is clearly the recommended pathway. Indeed, tinnitus originating from ear disorders such as acoustic neuroma, eustachian tube dysfunction, pulsatile tinnitus, and other objective tinnitus etiologies are generally managed through medical and/or surgical treatment. However, the vast majority (perhaps 95% or more) of all tinnitus patients have subjective tinnitus.⁶

Subjective tinnitus typically accompanies sensorineural hearing loss, secondary to presbycusis, noise-induced hearing loss, and acoustic trauma, etc. Subjective tinnitus is generally defined as the perception of sound in the absence of an external sound source.

There are many options for management of subjective tinnitus. The condition is generally managed by hearing aid amplification, biofeedback, hypnosis, counseling, cognitive behavioral therapy, habituation, electrical stimulation, tinnitus maskers, combined tinnitus masker and hearing aids, sound machines, self-help and support groups, educational groups, stress management, pharmacology, and more. The specific management protocol is chosen by the hearing healthcare professional working in concert with the patient, taking into consideration their needs, abilities, and desires.

Henry et al. provides specific audiologic and psychoacoustic tests and comprehensive protocols for evaluating and managing tinnitus patients.^{2,7} Additionally, the American Academy of Audiology's *Audiologic Guidelines for the Diagnosis & Management of Tinnitus Patients* recommends evaluation guidelines, procedures, referral criteria, outcomes measures, as well as CPT codes and related considerations.⁸

This article will review the contemporary literature regarding the efficacy of and trends in tinnitus

management facilitated by the most common tool used in hearing healthcare, hearing aids, as hearing aid amplification remains the first line of defense in the treatment of subjective tinnitus in appropriate patients.

Two important concepts worthy of attention are that there is no scientific evidence to support the use of alternative treatments such as acupuncture, homeopathy, and/or herbal remedies such as ginkgo biloba for the management of tinnitus; and that Sweetow and Sabes report it is unethical and immoral to tell a tinnitus patient “There is nothing that can be done for you.”^{8,9,10}

LITERATURE REVIEW

Newman states that hearing aid amplification is useful for managing tinnitus in two ways.¹¹ First, hearing aids amplify ambient background noise which may simply cover up or mask the patient's perception of tinnitus. Second, while wearing hearing aids, the patient improves their communication ability, likely leading to a reduction of stress.

Henry, Dennis, and Schechter report hearing aid amplification has served as the audiologic mainstay of tinnitus treatment for more than half a century. They note that even for marginal hearing aid candidates, high frequency amplification may be “accepted and beneficial.”

They also report data from Surr, Kolb, Cord, and Garrus who administered the Tinnitus Handicap Inventory (THI) prior to and after the hearing aid fitting and demonstrated a statistically significant reduction in THI scores six weeks post-fitting, stating that some 90% of tinnitus patients may benefit from hearing aid amplification.¹²

Del Bo and Ambrosetti stated that tinnitus patients receive two major benefits from hearing aids: the patient becomes less aware of their tinnitus and the patient improves their communication ability.¹³ They report tinnitus is often a result of neural plasticity, evoked via deprivation of auditory input (i.e., hearing loss), and as hearing aid amplification activates the auditory nervous system, the perception of tinnitus is reduced.¹⁴

Del Bo and Ambrosetti also note that for the best results, binaural amplification with open fittings and the widest possible bandwidth are recommended and interestingly, they suggest noise reduction should be

disabled, so as to allow background and inconsequential noise to enter the auditory system. Forti, Crocetti, and Scotti et al. further underscored the usefulness of open-canal fittings for tinnitus patients with mild hearing loss.¹⁵

Kochkin and Tyler report tinnitus as much more of a problem than simply perceiving unwanted sounds. Indeed, they note tinnitus may impact a person's emotional well-being and may negatively impact socialization, relaxation, and job performance, and may contribute to psychological problems such as depression, stress, anxiety, anger, and even suicidal thoughts. Newman, Sandridge, Meit and Cherian further add that tinnitus is a distressing symptom which negatively impacts the health-related quality of life of many individuals.¹⁶

Referring to a recent Better Hearing Institute survey of some 230 hearing healthcare professionals, Kochkin and Tyler report that 60% of all tinnitus patients receive some relief from tinnitus while wearing hearing aids and that 88% of hearing healthcare professionals use amplification to treat the condition.

Sweetow and Sabes identify three primary aspects of tinnitus—auditory, attentional, and emotional. They note that all tinnitus patients experience auditory aspects of tinnitus; however, the attentional aspect is manifested when the patient focuses so much of their conscious energies on their tinnitus that it interrupts their ability to focus, concentrate, and/or work efficiently. The emotional aspect of tinnitus is arguably the most destructive as anxiety, hopelessness, depression, and suicidal thoughts may emerge.

The authors also note four primary strategies used by hearing healthcare professionals to help manage tinnitus: tinnitus retraining therapy, acoustic de-sensitization, sound enrichment (i.e., hearing aid amplification), and cognitive-behavioral therapy. Amplification may be useful by itself, but is likely more effective when combined with counseling, they add.

Within their category of sound enrichment, Sweetow and Sabes include wearable noise generators, music, hearing aids (preferably open canal when possible), radio, TV, fans, and relaxing sounds. The authors state three goals of these sound enrichment protocols, to stimulate and soothe the limbic system, to stimulate the auditory neural pathways, and to compensate for hearing deficits—such that the perceived tinnitus interacts with a neutral sound which can be ignored.

This is quite different from masking protocols in which the external masker covers up the tinnitus. The authors state that hearing aids can be enormously effective in assisting tinnitus patients based on the five factors listed here:

- Hearing aid amplification serves to increase neural activity. Presuming tinnitus is exacerbated by silence, the brain may seek neural stimulation which is otherwise attenuated secondary to hearing loss.
- Tinnitus may be related to a lack of neural inhibition and hearing aid amplification may help the brain's inhibitory function correct itself.
- Because tinnitus is not subject to in-depth analysis (as is speech), the brain may not be able to determine its meaning. In this regard, hearing aid amplification may supply a

truer auditory signal to attend to, thus helping the brain recognize true sound versus pseudo-sound.

- Hearing aids amplify background noise such that they may provide partial masking while reducing the difference between amplified sound and tinnitus.
- As hearing aids reduce listening fatigue and stress, the ability to cope with tinnitus is improved.

Searchfield, Kaur and Martin reported that when hearing aid amplification was combined with counseling, the positive impact on patients was twice as successful as the expected benefit via counseling without amplification.¹⁷ Additionally, Aazh, Moore and Roberts reported that for counseling to be effective, the patient must be self-motivated. Sweetow and Sabes also concur; stating that tinnitus management procedures such as hearing aid amplification need to be supplemented with appropriate counseling for maximal success.

CONCLUSION

Hearing aid amplification has maintained its prominence as the primary treatment option for tinnitus. Examples of successful management of the tinnitus patient facilitated through hearing aid amplification for individuals with hearing loss and tinnitus are voluminous. Additionally, the clinical outcomes

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of hearing aid fittings for people with relatively normal hearing, and for those with mild-to-moderate sensorineural hearing loss (who might otherwise not seek amplification) are also very good.

Advanced hearing aids offer a vast multitude of sound processing abilities, including extended bandwidths; variable compression knee points and compression ratios; connectivity options for daily use, including television, telephones, open-canal fittings, receiver-in-the-ear options, and more. Of note is the fact that none of these advanced options have, as of yet, been exhaustively evaluated with respect to the tinnitus patient and remain worthy of further significant scientific exploration.

An important consideration when fitting anyone with tinnitus is that hearing aids are 100 percent reversible. That is, if the hearing aid fitting doesn't significantly impact the perception of tinnitus, the hearing aids can be removed. Therefore, until outcomes/evidence-based studies are available with regard to advanced hearing aids and tinnitus patients, we must proceed with the utmost caution as we endeavor to assist people suffering from significant tinnitus, while being mindful of the likely benefits available through advanced hearing aid amplification.

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