Evidence-based Management of Patients with Tinnitus and Hearing Loss: An Introduction

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Abstract
Hearing loss is an important factor in managing tinnitus patients. The tinnitus perception is associated with increased central compensatory mechanisms in response to decreased peripheral input; accordingly, acoustic stimulation is often an important component of an effective tinnitus treatment program. Ear-level devices, such as hearing aids, sound generators (which emit external sounds such as noise or chimes), or tinnitus combination instruments (hearing aids with integrated sound generators) have been utilized to reduce the tinnitus perception and provide tinnitus relief. However, devices alone cannot address the negative effects that tinnitus inflicts on quality of life. This review briefly explores efforts to maximize patient outcomes through a more comprehensive approach that integrates education and counseling elements with acoustic stimulation.

Keywords: Tinnitus treatment; Tinnitus relief; Hearing aids; Sound therapy; Hearing loss

Introduction
More than 50 million people in the United States experience tinnitus, the phantom perception of sound that does not originate from an external sound source [1]. Although tinnitus can be perceived by people of all ages, the prevalence of tinnitus progressively increases with age and hearing loss [2]. There have been many hypotheses attempting to explain the mechanisms of the source of tinnitus, but neurophysiological models postulate that tinnitus is linked with missing or dysfunctional outer hair cells in the cochlea [3]. This auditory deprivation can trigger an increase in spontaneous activity in the auditory cortex, resulting in the tinnitus perception [4].

Tinnitus patients are not a homogeneous group, which adds to the challenge in providing a clinical program that addresses the diverse needs of patients who report tinnitus to a health care provider. In determining cases that warrant intervention, clinicians who manage tinnitus patients must differentiate from those who simply experience tinnitus from those that suffer from it [5,6]. Most of those who experience tinnitus are not bothered by their symptoms. While the tinnitus perception itself is common, only about 20% of cases are problematic [2]. And yet, each year debilitating tinnitus prompts millions of people to seek help from health care providers [7]. When tinnitus becomes distressing, it can inflict a multitude of detrimental effects on quality of life, including interference with sleep, concentration, and relaxation [5].

The goal when treating persistent, bothersome tinnitus is not about eliminating the tinnitus itself (which, when sensorineural hearing loss is involved, is not possible), but rather to reduce the severity of this condition and the negative impact on each patient’s quality of life. The success of any tinnitus treatment program can be defined and quantified in a number of ways, depending the nature of each individual case, such as helping the patient obtain relief from his/her tinnitus, reducing the annoyance and disruptiveness, or reducing and even eliminating the interference that tinnitus inflicts on one’s enjoyment of life.

Acoustic stimulation for tinnitus relief
Hearing loss is an important factor in managing patients with tinnitus. Given the evidence that tinnitus is associated with decreased peripheral input, acoustic stimulation is often an important component of an effective tinnitus program. Ear-level devices, such as hearing aids or sound generators that emit external
sounds (e.g., noise or soothing chimes), have been utilized to reduce the tinnitus perception. For patients with both tinnitus and hearing loss, tinnitus combination instruments (hearing aids with built-in sound generators)

provide amplification to correct for lost audibility while the sound generator simultaneously provides additional relief via sound therapy. Regardless of the type of device, the literature supports the use of acoustic stimuli through hearing aids or sound generators for tinnitus relief [8-10].

Providing sound stimulation via amplification or other external sounds will produce neural activity which will compete with the central auditory representation of tinnitus, thus minimizing the strength of the tinnitus signal [10]. Although acoustic stimulation can provide therapeutic relief from the tinnitus perception, devices alone are inadequate to achieve the goal of reducing the negative impact of tinnitus on quality of life. Numerous studies have demonstrated that therapeutic sound provides the greatest benefit when patients are also provided education, reassurance, and counseling [8-12]. These findings provide strong support for the notion that clinicians need a comprehensive, effective, and evidence-based approach in order to maximize treatment outcomes for patients with tinnitus.

**Current tinnitus management protocols**

Efforts to establish and coordinate logical approach to this large-scale health care problem are ongoing; for example, the VA Medical Center for Rehabilitative Auditory Research has updated their Progressive Tinnitus Management protocol since 2005 to more broadly address the functional and emotional impairment of tinnitus, offering a hierarchical approach to offer clinical services to veterans with diverse levels of need [8]. In 2014, the American Academy of Otolaryngology-Head and Neck Surgery Foundation (AAOHNSF) published evidence-based clinical guidelines to provide a framework for providing assessment, intervention, and education for all adults (not just veterans) with persistent, bothersome tinnitus. Within these guidelines, the authors provided recommendations for various treatment options (including education and counseling, hearing aids, sound and cognitive behavioral therapy) while providing recommendations against other options, such as medications, dietary supplements, and other alternative therapies [6].

There is a clear need for consistency among clinicians managing patients with tinnitus; prior to the publication of these guidelines, a 2007 National Health Interview Series survey found less than one in four patients who discussed their tinnitus symptoms with their physician received management recommendations in concordance with the current AAO-HNSF guidelines [13].

**Directions**

A pilot study is underway to evaluate the efficacies of acoustic stimulation as part of a comprehensive tinnitus management protocol for tinnitus patients with hearing loss; this program is designed to implement and integrate AAO-HNSF recommendations for intervention and education into one streamlined program.

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**Conflict of Interest**

No conflict of interest.

**References**