Tinnitus in a Non-Hearing Ear: Prevalence and Efficacy of Baha Use for Treatment

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OBJECTIVES:
1) Establish the prevalence of tinnitus in patients with unilateral, unabated sensorineural hearing loss (SNHL).
2) Assess the impact of Baha implantation on tinnitus.

INTRODUCTION:
Tinnitus is defined as the perception of sound in the absence of an acoustic stimulus. Prevalence in industrialized countries is 8-30%. In candidates for cochlear implant, the prevalence is even higher, between 66 and 86% before implantation, with 27% of patients reporting significant impact on quality of life.

Cochlear implant device use is associated with a reduction in tinnitus intensity and awareness in up to 86% of patients. Sound stimulation is postulated to play an important role in decreasing awareness of signals generated in the cochlea or other parts of the auditory pathway.

The osseointegrated Baha device has been used extensively with success for patients with unilateral hearing loss in whom conventional hearing amplification is insufficient for rehabilitation of their loss. Candidates considered suitable for surgery have a small titanium implant placed in the mastoid bone behind the ear. Once the implant has fused with bone, a sound processor is easily connected and transfers sound via bone conduction to the contralateral healthy cochlea. Very little is present in the literature regarding improvement of tinnitus with sound stimulation via bone conduction.

Examining the effect of Baha on tinnitus will also have important implications on Tinnitus Retraining Therapy, which consists of sound therapy along with counseling designed to mitigate fears and concerns. Sound therapy requires hearing to be intact enough to perceive sound, but it is unclear if sound therapy can be effective in patients with a non-hearing ear. Perhaps sound presented to the contralateral hearing ear can help control tinnitus.

METHODS:
Study Design:
Prospective observational study of consecutive patients with unilateral, unabated SNHL who were candidates for Baha implantation. The prevalence of tinnitus in this population was assessed using validated surveys. Patients receiving a Baha implant underwent reassessment postoperatively.

Inclusion Criteria:
Patients >18 yo with chronic unilateral sensorineural hearing loss, poor word recognition scores (un-admisible), and preserved hearing in good ear (<20 dB).

Exclusion Criteria:
Patients undergoing Baha for conductive hearing loss or inability to wear a hearing aid.

Data Collection:
Tinnitus was quantified with two validated questionnaires, the Tinnitus Handicap Inventory (THI) and the Tinnitus Severity Index (TSI). All subjects received the questionnaires at their initial evaluation. Baha patients completed them a second time at least 3 months post-activation. Pre- and post-activation results were compared using a two tailed, paired T-test.

RESULTS:
1. 9 of 17 patients with unilateral SNHL reported having tinnitus, defined as a score >16 on the THI (prevalence 52%).
2. The pre-Baha mean THI score was 31.8 ± 21.8, as compared with a post-Baha mean score of 14.6 ± 11.1 (p = 0.097). The pre-Baha mean TSI score was 29.3 ± 13.0, as compared with a post-Baha mean score of 26.6 ± 8.17 (p = 0.65).

CONCLUSIONS:
1. Prevalence of tinnitus is higher in patients with unilateral SNHL (52%) than in the general population (8-30%), and lower than in the cochlear implant population (66-86%).
2. There may be a reduction in tinnitus-related handicap in patients who have received osseointegrated bone conduction devices.
3. Patients with single-sided deafness who are considering an osseointegrated bone conduction device may be counseled on the additional possibility of tinnitus improvement.
4. Auditory stimulation via bone conduction could potentially be a mode of treatment for tinnitus in selected patients.

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