Audiological Rehabilitation of the Tinnitus Client

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Audiologists are often responsible for the management of the tinnitus client. We describe a general plan that includes (a) initial counseling, (b) handicap evaluation, (c) psychoacoustical measurement, and (d) in-depth counseling. The initial counseling session includes determining the severity of the client's tinnitus and providing information about tinnitus. If the client requires further evaluation, the handicapping nature of the tinnitus can be determined in more detail with an open-ended problems questionnaire or a tinnitus handicap scale. In some situations it is useful to measure tinnitus pitch, loudness, and its masking and postmasking characteristics. In the subsequent counseling session, it is necessary to discuss the evaluation results and treatment options, and to provide a realistic but hopeful outlook. Audiologists can fit hearing aids and tinnitus maskers to reduce tinnitus and can provide cognitive behavior-modification therapy.

Many clients have tinnitus that causes them great concern. Unfortunately, little is known about the causes of tinnitus. Most treatments are ineffective, and there is no way to identify a priori those clients for whom any particular treatment is effective (see McFadden, 1982, for a review). This makes it difficult to decide on the appropriate direction for the management of the tinnitus client.

It is a common and natural tendency for professionals to avoid situations that are unpleasant or in which they feel inadequate (Clark, 1984). When medical management is ineffective, audiologists are often in the best position to quantify the handicap, provide an overview of alternative treatment options, and provide counseling. Tinnitus clients often have hearing loss, and audiologists have training and experience in providing counseling for hearing-impaired persons. This article provides a general strategy for rehabilitation of the tinnitus client.

GENERAL APPROACH

Our general approach to tinnitus rehabilitation is shown in Figure 1. This

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description focuses on clients who have had a complete audiological and otological evaluation, and have been referred to, or seek help from, audiologists for their tinnitus management. Medical treatment of any existing condition which may produce tinnitus should have occurred before this part of the rehabilitation process.

Initial counseling is recommended for all clients identified as having tinnitus. This provides general information to the client, and allows the audiologist to determine the severity of the problem associated with tinnitus. Clients who do not have problems associated with their tinnitus can be followed up in about one year. For clients who do have problems associated with tinnitus, the tinnitus handicap can be assessed with questionnaires. It may be useful to quantify the tinnitus psychoacoustically. This is followed by another counseling session, which leads to a detailed discussion of treatment options. With some clients this can be accomplished at a single visit; others will need to return. Two treatment options can be administered by audiologists: (a) hearing aids and tinnitus maskers and (b) cognitive behavior-modification therapy. Some audiologists also provide biofeedback training. Referrals to other professionals may also be appropriate.

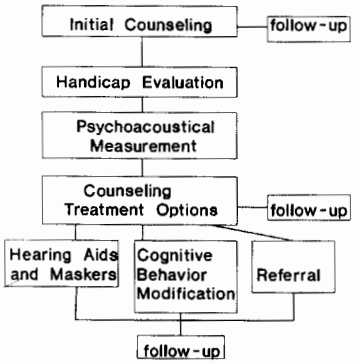

Figure 1. A schematic representation of a general plan for the audiological rehabilitation of the tinnitus client (see text).

INITIAL COUNSELING

Clients typically visit an audiology clinic because they are concerned about hearing loss or tinnitus. A study in Sweden reported that 59% of the clients seen in a hospital hearing clinic had tinnitus (Lindberg, Lyttkens, Melin, & Scott, 1984). Stouffer and Tyler (in press) studied clients with tinnitus who were being seen in an audiology/otology clinic. Thirty-eight percent were primarily worried about hearing loss and 48% were primarily worried about tinnitus. In clients who have tinnitus and hearing loss, most were worried more about their tinnitus.

Following an audiological evaluation, the findings and implications of hearing loss are usually discussed. For clients with tinnitus, this is often an appropriate time to provide initial counseling regarding tinnitus. It is necessary that sufficient time be allocated for this. Clients often are frustrated from having been sent to several professionals and not having been helped.

Listen to the Client

Clients should be asked to describe their tinnitus and any problems associated with it. This provides the audiologist an opportunity to learn about the factors perceived by the client as important. It also gives clients time to discuss their problem with an empathetic listener, which can be therapeutic in itself. This listening can help establish better rapport between the audiologist and the client, as well as help reassure an anxious client that the audiologist is available and willing to help manage the problem of tinnitus (Schum, 1986).

Clark (1984) cited several desirable attributes of counselors. They listen objectively and genuinely, avoiding professional jargon, and demonstrate acceptance of their clients as important human beings. Clients can be encouraged that they have sought help for their tinnitus. For clients who do not openly reveal their concerns, a more formal questionnaire or leading questions from the counselor may be helpful.

Provide Information

It sometimes helps for the audiologist to describe the tinnitus reported by other clients. For example, many clients hear ringing (38%), buzzing (11%), crickets (9%), hissing (8%), or whistling (7%) (Stouffer & Tyler, in press). This helps clients appreciate that the audiologist knows that their tinnitus is a real phenomenon and not merely an imaginary ailment.

Prevalence

Clients should be informed that tinnitus is very common. Surveys in the United States indicated 32% of the general population had some form of tinnitus, and in 2% of the population tinnitus was severe (National Center for Health Statistics, 1967, 1980). From a survey performed in the United Kingdom, Coles (1984) reported 0.5% of the general population indicated tinnitus interfered with their ability to lead a normal life. Thus, between about 1% and 2% of the general population (between 1 in 100 and 1 in 50) have reported a severe tinnitus. It is likely that some friends and acquaintances of the client also have tinnitus.

Other Diseases

Stouffer and Tyler (in press) reported that 60% of tinnitus clients are worried that tinnitus is a symptom of a much worse disease. It is important to determine if other diseases are present. Some diseases that have tinnitus as a symptom can be treated medically or surgically, such as glomus tumors, arterio-ventricular malformations, Ménière's disease, and acoustic tumors. A medical referral is necessary if they have not seen an otolaryngologist recently about their tinnitus or hearing loss.

Mechanisms

Although little is known about the physiological mechanism of tinnitus (e.g., Rees & Miller, 1984), numerous models have been proposed (e.g., Evans,

Wilson, & Borerwe, 1981; Hazell, 1987a; Kiang, Moxon, & Levine, 1970; Mœller, 1984; Tonndorf, 1987). Unfortunately, these models are largely speculative. However, it is important to reassure clients that researchers are developing models of tinnitus and that basic and clinical research on tinnitus is being funded by government agencies.

One simple way to model tinnitus is to describe it as an increase in the normal spontaneous activity of nerve fibers. Nerve fibers from the ear to the brain carry information in the form of electrical impulses. Without any external sound, a few spontaneous impulses are present in the auditory system. When an external sound is presented, the number of impulses increases substantially, creating the perception of sound. With tinnitus, the spontaneous activity may be increased abnormally, resulting in a perception of sound even without an external stimulus.

Although an increase in the spontaneous activity of nerve fibers may not occur in all types of tinnitus, it is likely to occur in some types (Evans et al., 1981; Salvi & Ahroon, 1983; Tyler, 1984). A focal tinnitus pitch could occur in two ways. If pitch depends primarily on place of nerve-fiber activity, then a focal pitch would occur if a few fibers originating from a similar place on the basilar membrane were spontaneously active. If pitch depends primarily on the rate of nerve-fiber activity, then a focal pitch would occur if several fibers were spontaneously active and firing in a periodic, synchronous manner.

Causes

Most causes of hearing loss can also result in tinnitus. Some of the more common examples are noise exposure, ototoxic drugs, and aging (Brown et al., 1981). Table 1, from Stouffer and Tyler (in press), lists a variety of causes perceived by clients as producing their tinnitus. When the audiologist describes the different factors that produce tinnitus, clients learn that it is not their fault that they have tinnitus. In many cases the cause is unknown, and sometimes dwelling on the cause is counterproductive to rehabilitation.

Treatment Options

During this initial counseling session it is helpful to mention briefly some of the treatment options that are available. If the client has a debilitating tinnitus, these options can be discussed in more detail later. Several reviews are now available that describe tinnitus treatment regimens (e.g., Bentler & Tyler, 1987; Clark & Yanick, 1984; Coles, 1987; Hazell, 1987b; LaMarte & Tyler, 1987; Slater & Terry, 1987; Stephens, Hallam, & Jakes, 1986; Tyler & Babin, 1986).

1. *Treatment for the reduction of stress associated with tinnitus.* Several treatments are used to help tinnitus clients relax. Drug therapy for tinnitus is often used to reduce stress, annoyance, lack of sleep, depression, and other tinnitus sequelae (Goodey, 1987). However, the success rate of drug treatment is often very low, and there are sometimes undesirable side effects. Clients interested in pursuing drug treatment should be referred to an otolaryngologist who is known to be interested in the pharmacological treatment of tinnitus.

Table 1
What Clients Think Caused Their Tinnitus

Cause	Percent of Males (n = 293)	Percent of Females (n = 235)	Percent of Total (n = 528)
Noise	23	4	14
Hearing Loss	11	15	13
Illness	9	15	12
Accident	8	7	7
Drugs/Medicine	2	3	3
Surgery	1	4	2
Food	0	0	0
Alcohol	0	0	0
Smoking	0	0	0
Other	2	3	3
No idea	44	49	46

Note. Adapted from "Characterization of Tinnitus by Tinnitus Patients" by J.L. Stouffer and R.S. Tyler, in press, *Journal of Speech and Hearing Research.*

Biofeedback has been reported by some investigators to be helpful (House & House, 1987), but has been questioned by others (Ireland, Wilson, Tonkin, & Platt-Hepworth, 1985). In some severe cases, hypnosis has reportedly helped clients cope with their tinnitus. Other psychological procedures are cognitive behavior therapy (Sweetow & Levy, 1989), progressive relaxation (Bernstein & Borkovec, 1973), and "imaginative transformation" (Meichenbaum, 1977, pp. 175-176). In the latter technique, clients imagine their tinnitus as an object. The object could be a building, a block, or a tower, for example. They are trained to perceive the object as getting bigger and the tinnitus as getting worse, and the object getting smaller and the tinnitus getting better. In this way clients learn to adjust their perception of the tinnitus. It is desirable for the audiologist to establish some professional contact with a hypnotist, psychologist, and biofeedback therapist before referring clients. These therapists may have limited knowledge about tinnitus, and will usually benefit from and appreciate an initial meeting with the audiologist to discuss tinnitus.

Many tinnitus clients report difficulty sleeping (Slater & Terry, 1987; Stouffer & Tyler, in press; Tyler & Baker, 1983). Referral to a sleep-disturbance clinic may be helpful.

2. *Treatment for the reduction of tinnitus.* Acupuncture has been used to treat tinnitus, but has been largely unsuccessful (Hallam, 1987). For example, Hansen, Hansen, & Bentzen (1982) reported on a double-blind cross-over trial of acupuncture treatment of tinnitus. No difference was found between using the correct acupuncture points and a placebo treatment which did not use the correct acupuncture points.

Although there is no well-established relationship between nutrition and tinnitus, some clients have indicated various foods and drinks exacerbate tinnitus, particularly caffeine and alcohol (e.g., Slater & Terry, 1987). Clients can be encouraged to systematically modify their diet to determine if eating or drinking certain items reduces or eliminates their tinnitus. To ensure that restriction of problem foods does not have an adverse influence on the client's health, consultation with a dietician is warranted.

Hearing aids can sometimes reduce tinnitus (Hazell et al., 1985; Vernon & Schleuning, 1978). Hearing aids amplify background noise and speech, either of which may mask or partially mask tinnitus and therefore reduce annoyance. Because hearing aids can reduce tinnitus as well as assist speech communication, this is usually the first approach. Alternatively, tinnitus maskers that produce a noise to mask or partially mask tinnitus are also sometimes effective (Hazell et al., 1985; Tyler & Bentler, 1987).

Some drugs are used to reduce tinnitus. The drug lidocaine has been shown in repeated double-blind trials to be effective in reducing tinnitus in 30-60% of patients (e.g., Martin & Coleman, 1980). The drug is not used clinically because it must be given intravenously, and it has a very short duration effect. Other medications are being investigated (Tyler, Murai, Harker, & Stouffer, 1990).

Determining the Seriousness of the Client's Reaction to the Tinnitus

At the end of the initial counseling session, the seriousness of the tinnitus client's problem needs to be assessed. After learning more about the disorder, many clients will decide that additional treatment is unnecessary. These clients should be encouraged to return if their hearing loss or tinnitus worsens or if they have additional questions. Other clients need an in-depth tinnitus evaluation and further treatment. Those with very serious psychological/medical problems require immediate referral.

ASSESSING THE TINNITUS HANDICAP

When tinnitus interferes with the ability to lead a normal life (Stephens & Hallam, 1985), questionnaires can be helpful to understand the nature and magnitude of the problem.

Open-Ended Questionnaire

An open-set questionnaire asks clients to list the problems they attribute to their tinnitus (Tyler & Baker, 1983). Frequently-mentioned problems are listed in Table 2. These open-ended questions have the advantage that the client has the opportunity to write about any problem. Problems seen from the client's perspective may or may not be similar to those listed in a predetermined set of questions.

Tinnitus Handicap Questionnaire

A tinnitus handicap questionnaire (Kuk, Tyler, Russell, & Jordan, 1989) is

similar to a hearing handicap scale in that it contains a list of questions pertaining to the intrusive nature of tinnitus (see Appendix). Subscores are available for (a) the social, emotional, and physical consequences of tinnitus; (b) the effect of tinnitus on hearing; and (c) the client's view of tinnitus. It also allows for comparison of the magnitude of handicap across clients. Other tinnitus questionnaires are being developed (Sweetow & Levy, 1989; Wilson, Henry, Bowen, & Haralambous, 1989).

MEASURING PSYCHOACOUSTICAL ASPECTS OF TINNITUS

It is impossible to measure several attributes of tinnitus, including pitch (Burns, 1984; Penner, 1983; Tyler & Conrad-Armes, 1983a), loudness (Hinchcliffe & Chambers, 1983; Penner, 1984, 1986; Tyler & Conrad-Armes, 1983b), masking (Tyler & Conrad-Armes, 1984), and postmasking effects (Feldman, 1971; Penner, 1988; Tyler, Conrad-Armes, & Smith, 1984). The application of these techniques to clinical management, however, is uncertain. It should be noted that tinnitus loudness cannot be interpreted in sensation-level estimates, because of the effect of loudness recruitment (Tyler & Conrad-Armes, 1983b; Penner, 1984).

Measurement of tinnitus is potentially helpful to demonstrate that the tinnitus is a real symptom and to determine if the tinnitus can be masked (Tyler & Bentler, 1987). To monitor changes in tinnitus, it may be desirable to measure tinnitus over several visits or during tinnitus treatment, for example before and

Table 2

Problems Associated with Tinnitus Reported by a Tinnitus Self-Help Group

Difficulty	Percent of Respondents (N = 72)
Getting to sleep	57
Persistence of tinnitus	49
Understanding speech	38
Despair, frustration, depression	36
Annoyance, irritation, inability to relax	35
Ability to concentrate, confusion	33
Dependence on drugs	24
Pain/headaches	18
Worse upon awakening in morning	17
Insecurity, fear, worry	17
Avoidance of noisy situations	15
Withdrawal, avoidance of friends	14
Giddiness, balance, fuzzy head	14
Understanding television	11
Avoidance of quiet situations	11

Note. Adapted from "Difficulties Experienced by Tinnitus Sufferers" by R.S. Tyler and L.J. Baker, 1983, *Journal of Speech and Hearing Disorders, 48,* pp. 150-154.

after drug therapy (e.g., Tyler, Babin, & Niebuhr, 1984). At the present, tinnitus characteristics do not help to determine the appropriate treatment regimen, nor are they prognostic. Further research to evaluate the relationship between psychoacoustical measurements of tinnitus and treatment may be beneficial.

COUNSELING

After learning more about the problems that the client associates with tinnitus, and quantifying the tinnitus, it is useful to provide additional counseling. In general this will take the same form and cover the same issues as the initial counseling session described above, but cover the areas in greater depth.

Clients will often have additional questions, or may wish to share other experiences about their tinnitus. When clients ask about their tinnitus and its treatment, direct and honest answers are recommended. The problems listed by the client on the handicap questionnaires can be reviewed to be sure that they are clearly defined by the client and are understood by the audiologist. Operational definitions of these problems are useful. Clients can be shown that many of their problems are shared by others.

Treatment options can be described in more detail. Local professionals who see tinnitus clients are identified. Clients are informed that success is achieved sometimes, but in other cases the treatment is not completely satisfactory.

Through local self-help tinnitus groups, clients are reassured in knowing that many others share their reactions to tinnitus. The American Tinnitus Association (P.O. Box 5, Portland, OR 97207) also distributes an excellent client handout on tinnitus. These groups provide an opportunity for the client to keep informed of new treatments and research activity. Sweetow (1984a) cautions that these nondirected groups sometimes discuss inappropriate (or dangerous) remedies in the absence of a professional group leader. However, these groups are generally helpful, and are often attended by audiologists or have audiologists as consultants.

One must be careful not to foster unrealistic expectations; however, some clients are very depressed because of their tinnitus. It is helpful to inform them that new tinnitus treatments are being tested, such as electrical stimulation (e.g., Aran, 1981; Kuk et al., 1989; Vernon, 1987).

HEARING AIDS AND TINNITUS MASKERS

A description of fitting hearing aids, tinnitus maskers, and combination hearing-aid/tinnitus masker units has been provided by Tyler and Bentler (1987), Sheldrake, Wood, and Cooper (1985) and Hazell et al. (1985). Tinnitus maskers produce noise that can reduce tinnitus in some clients (Hazell et al., 1985; McFadden, 1982; Stephens & Corcoran, 1985; Tyler & Bentler, 1987). It is helpful to have a tinnitus masker available to show to clients during discussion of this treatment option. A probe-tube acoustic measurement system can be useful to determine the spectrum of the masking noise at the eardrum. This can be particularly useful to identify and remove prominent peaks in the spectrum,

which may be annoying. The noise spectrum in maskers can usually be modified electrically or by earmold changes. It is not necessary to have the masking noise occur in the same frequency region as the tinnitus pitch-match frequency. Narrow bands of noise have a tonal quality and are typically more uncomfortable to listen to than broadband noise. Sometimes binaural maskers are useful when monaural maskers are ineffective.

Non-wearable bedside maskers are available to help clients get to sleep. Audio cassettes with "relaxing" sounds (e.g., waves lapping against the sand) can be purchased, or clients can make their own recording of whatever works.

The actual number of clients who benefit from tinnitus maskers remains controversial (see McFadden, 1982; Tyler & Bentler, 1987). The success rate depends upon the population being considered and how success is defined. One useful approach would be to define success as the purchase of a tinnitus masker after a four-week trial. In situations in which the masker is provided free of charge or at greatly subsidized rates, a useful definition of success would be regular use after a six-month period. Such a standard for all investigations would facilitate comparisons. Regular use does not have to be all day, as some clients may require the maskers only intermittently.

In our experience, less than 10% of the clients who enter our clinic and request help for their tinnitus actually purchase a masker after a four-week trial period. The percentage may be higher in clients who are more desperate to obtain relief from their tinnitus. However, some clients who purchase the device or accept it freely may find the masker less helpful after a few months. Nonetheless, tinnitus maskers do work in some clients and should be considered a viable treatment option.

COGNITIVE BEHAVIOR MODIFICATION THERAPY

Cognitive behavior modification therapy can offer a systematic approach to identifying and implementing necessary changes (Sweetow, 1984b, 1986). Working with an experienced psychologist is desirable. If the audiologist is uncomfortable with such techniques, then a referral is needed.

Clients learn that tinnitus is an uncontrollable physical event, but that reaction to the tinnitus, including one's cognitive evaluation of the situation and affective reaction, are controllable. In assuming responsibility for cognitive/affective reactions, clients can become active in choosing coping responses, which include how one interprets and manages the tinnitus. Meichenbaum (1977) has written about the application of this approach with "stress-inoculation" in response to chronic pain conditions. Applications to the treatment of tinnitus are found in Hallam (1987), Sweetow (1984b, 1986), and Scott, Lindberg, Lyttkens, and Melin (1985).

FOLLOW-UP

It is useful to see clients on a regular basis after treatment is complete. These

follow-up meetings show them that the audiologist is interested in their well-being and provide an opportunity to monitor the effects of therapy and their current status.

SUMMARY

The audiologist is often the person who eventually assumes responsibility for the management of the tinnitus client after complete otolaryngologic evaluation has ruled out any treatable medical cause. In an initial counseling session, the audiologist (a) listens to the client, (b) provides information about tinnitus, and (c) decides if the client requires further evaluation. Tinnitus handicap questionnaires can be administered, and the tinnitus can be measured with psychoacoustical tests. A more detailed counseling session follows, with an in-depth discussion of treatment options. The audiologist can provide hearing aids and tinnitus maskers, and in some cases can use cognitive behavior modification techniques.

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APPENDIX

IOWA TINNITUS HANDICAP QUESTIONNAIRE

The following tinnitus handicap scale is reported in Kuk, Tyler, Russell, and Jordan (1989).

Indicate to what degree you agree or disagree with the following statements by writing in a number from **0** to **100**.

0 indicates that you strongly disagree
100 indicates that you strongly agree

Numbers between **0** and **100** should also be used to represent your level of agreement with each statement. To obtain total score, subtract 100 from questions 25 and 26, add scores from all questions, and divide by 27.

PLEASE ANSWER *ALL* THE QUESTIONS.

1. I do not enjoy life because of tinnitus. _____
2. My tinnitus has gotten worse over the years. _____
3. Tinnitus interferes with my ability to tell where sounds are coming from. _____
4. I am unable to follow a conversation during meetings because of tinnitus. _____
5. Tinnitus causes me to avoid noisy situations. _____
6. Tinnitus interferes with my speech understanding when talking with someone in a noisy room. _____
7. I feel uneasy in social situations because of tinnitus. _____
8. The general public does not know about the devastating nature of tinnitus. _____
9. I cannot concentrate because of tinnitus. _____
10. Tinnitus creates family problems. _____
11. Tinnitus causes me to feel depressed. _____
12. I find it difficult to explain what tinnitus is to others. _____
13. Tinnitus causes stress. _____
14. I am unable to relax because of tinnitus. _____
15. I complain more because of tinnitus. _____
16. I have trouble falling asleep at night because of tinnitus. _____
17. Tinnitus makes me feel tired. _____
18. Tinnitus makes me feel insecure. _____
19. Tinnitus contributes to a feeling of general ill health. _____
20. Tinnitus affects the quality of my relationships. _____
21. Tinnitus has caused a reduction in my speech understanding ability. _____
22. Tinnitus makes me feel annoyed. _____
23. Tinnitus interferes with my speech understanding when listening to the television. _____
24. Tinnitus makes me feel anxious. _____
25. I think I have a healthy outlook on tinnitus. _____
26. I have support from my friends regarding my tinnitus. _____
27. I feel frustrated frequently because of tinnitus. _____