

# Different Treatment Modalities of Tinnitus at the EuromedClinic

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**Abstract:** A retrospective study at the ear, nose, and throat department of the EuromedClinic showed considerable improvements immediately after the end of the treatments for acute and for chronic tinnitus. Eighty percent of our patients suffering from acute tinnitus showed an improvement with intravenous medication without hyperbaric oxygen treatment, and 65.7% showed improvement with infusion therapy and hyperbaric oxygen. However, at 3 months and then later (long-term results), the figures decreased to 67% and 46%, respectively. In the chronic tinnitus group, the therapeutic effect dropped from 66.7% to 34% (with only intravenous medication) and from 60% to 28% (with combined therapy). These facts can explain the importance of beginning the treatment of patients suffering from tinnitus as early as possible (i.e., acute stage).

**Keywords:** hyperbaric oxygen therapy, infusion therapy, sudden deafness, tinnitus

The term *tinnitus* derives from the Latin *tinnire*. It includes in the head and the ear all types of noise sensations that are not generated by sound waves coming from outside [1]. Tinnitus is a matter of subjective feeling, similar to that of pain. It often leads to restlessness, social isolation, and psychosomatic disorders. Therefore, what appears to be essential is not only to examine people who suffer from tinnitus but to offer them treatment.

The subject of this retrospective study is the results of the treatment of acute and chronic tinnitus with conventional infusion therapy or hyperbaric oxygen (HBO) therapy (or both).

## MATERIALS AND METHODS

One hundred patients with tinnitus (71 male, 29 female) were evaluated in this study, 65 suffering from acute tinnitus and 35 suffering from chronic tinnitus. Permanent tinnitus remaining 8 weeks or longer was rated as chronic. The age distribution is shown in Figure 1. Forty-one patients complained of an isolated tinnitus. In 23 patients, tinnitus was accompanied by a

sudden hearing loss, in 12 by sensorineural hearing loss, in 9 by ventilation disturbance of the eustachian tube because of a chronic sinusitis, and in 1 by a vestibular neuritis. In eight patients, the tinnitus was caused by an acute otitis media, in three by an acoustic trauma, in two by a chronic otitis media, and in one by a labyrinthine contusion (Table 1). In one patient with a unilateral tinnitus, a diagnosis of acoustic neuroma could be made, and this patient was excluded from this study.

The treatment in the hospital lasted 7–10 days and included intravenous application of pentoxifylline (100–300 mg/day); lidocaine (Xylocaine; 10–16 ml); a cocktail of vitamins (Multibionta, 10 ml diluted in 250 ml glucose 5%); and facultative corticosteroids in decreasing doses starting with 250 mg (prednisolone) daily. Simultaneously, HBO treatment was offered daily (5–15 times) to 55 patients without inflammatory or cardiac contraindications to this therapy (up to 2.5 ATA up to 3 periods of 30 min breathing of pure oxygen with 2 pauses of 10 min air-breathing).

The success of this polypragmatic therapy was investigated with a tinnitus index. The annoyance of the tinnitus is rated on a subjective scale from 0 (no tinnitus) to 10 (unbearable) by the patients. Loudness and character of the tinnitus in comparison to sinusoidal tones, narrow-band noise, and broad-band noise also were monitored every second day.

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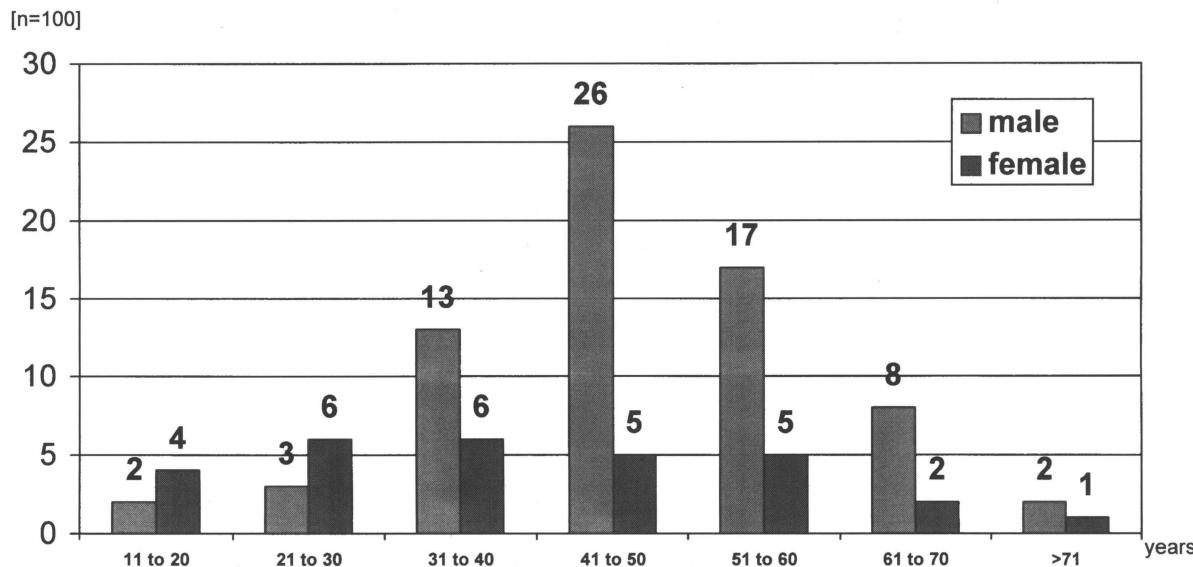


Figure 1. Age distribution of indoor patients with tinnitus at the EuromedClinic.

After analysis of the data, the grade of success was divided into four categories: no tinnitus, reduced, unchanged, and increased. The data before starting therapy were compared with the data recorded immediately after treatment and again at least 3 months later (long-term-results).

## RESULTS

The age distribution in this random sample of patients suffering from tinnitus shows a peak in the group from 41 to 50 years. This accumulation is concerned with men only (see Fig. 1). Side preference of tinnitus was not observed (28 right ear, 30 left ear, and 42 both ears). Complete disappearance of tinnitus during intravenous treatment could be observed in 11 (36.7%) patients, and in 3 (8.6%) patients after both treatment modalities all of whom were in the group for whom

therapy began within 8 weeks of onset of tinnitus. None of the patients with chronic tinnitus reported complete disappearance of tinnitus. An improvement (i.e., decrease) of the subjective annoyance could be achieved in 13 (43.3%) of the patients with acute tinnitus after intravenous medication and 20 (57.1%) after both treatments modalities. Nearly the same results could be achieved in the chronic tinnitus group (Table 2).

Only 55 patients could be checked for long-term results: 42 of the acute tinnitus group and 13 of the chronic tinnitus group (Table 3). The positive treatment effect (improved or stable condition) decreased from 80% (24 cases) to 67% in patients with acute tinnitus (12 patients) and therapy with infusions only and from 65.7% (23 patients) to 46% (11 cases) in patients with combined therapy (infusion and HBO). In the chronic tinnitus group, the treatment effect decreased from 66.7% (10 patients) to 34% (two patients, infusions only) and from 60% (12 cases) to 28% (two patients, combined therapy; compare results in Table 2 with those in Table 3).

**Table 1.** Diagnosis of Indoor Patients with the Main Symptom of Tinnitus

Symptom	No. of Patients
Tinnitus only	41
Sudden hearing loss	23
Sensorineural hearing loss	12
Ventilation disturbance of the eustachian tube	9
Acute otitis media	8
Acoustic trauma	3
Chronic otitis media	2
Vestibular neuritis	1
Labyrinthine contusion	1

## DISCUSSION

The causality of tinnitus can be of different genesis. Consideration of differential diagnosis (e.g., acoustic neuroma) is of great importance. A causal correlation between tinnitus and the factor of stress generally is accepted. Starting treatment of tinnitus as early as possible is significant [2–4]. The results of our indoor patients with acute tinnitus were at first excellent (80% success rate). Later, results decreased to 67% (see Ta-

**Table 2.** Outcome of Indoor Patients with Tinnitus

	Acute Tinnitus		Chronic Tinnitus		No. of Patients
	Intravenous Medication No. (%)	Intravenous Medication + HBO No. (%)	Intravenous Medication No. (%)	Intravenous Medication + HBO No. (%)	
Restitutio ad integrum	11 (36.7)	3 (8.6)	—	—	14
Reduced	13 (43.3)	20 (57.1)	10 (66.7)	12 (60)	55
Unchanged	6 (20)	10 (28.6)	5 (33.3)	8 (40)	29
Worse	—	2 (5.7)	—	—	2
Total	30	35	15	20	100

HBO = hyperbaric oxygen.

bles 2 and 3). The positive atmosphere from a private clinic might be the reason for the good early results in comparison with the later results (obtained from patient questionnaire). No significant difference was observed between the positive effect of intravenous medication only and combined treatment (intravenous medication and HBO).

An important consideration is that the therapeutic effect of the HBO therapy is proved through clinical and experimental studies [5–7]. The effect of the HBO therapy on tinnitus was investigated in studies with a total of 1,223 patients. In this case, according to a study of Almeling, [8] positive results were achieved also with patients who had experienced their tinnitus for even longer than 6 months. The HBO is recommended up to 3 months after onset of tinnitus. This treatment does not show a strict time limit [6].

Kellerhals and Zogg [1] described a considerably low chance of healing the tinnitus by early treatment (e.g., through infusions), but they do consider the HBO therapy in the early disease stage likely to be successful [1].

The treatment of chronic tinnitus is, in general, less sufficient than treatment of acute tinnitus. That also corresponds to our results (see Table 3). For tinnitus

that exists for more than half a year, Biesinger [2] recommended a drug therapy that can interfere with the transmission of the auditory signal in the inner ear and brain. He preferred lidocaine (as a drug for stability of the nerve cell membrane and for blocking the transmission of stimuli), a calcium antagonist, glutamate, or glutamate antagonists [2].

Shulman [4] also described the use of neuroprotective substances for the improvement of inner ear function, even in patients suffering from tinnitus. Furthermore, other means are available: calcium-channel blockers, called *free radical scavengers*; corticosteroids; glutamate antagonists; and miscellaneous thrombolytic drugs [4].

In our ear, nose, and throat department (one of three study centers in Germany) a caroverin double-blind test has just started. This test is being undertaken to prove the possible positive effect of the glutamate antagonist caroverin (cochlea-synaptic effect) [9]. The results of this study will be published later. Sakata and Itoh [9] also concentrated on the treatment of cochlear tinnitus. They administered to 1,214 patients intratympanic dexamethasone, 2 mg/wk. The positive effect was shown for 77% of patients immediately after the application and for 68% of patients even 6 months after the application [10].

**Table 3.** Long-Term Results of Indoor Patients with Tinnitus

	Acute Tinnitus		Chronic Tinnitus		Total No. of Patients
	Intravenous Medication No. (%)	Intravenous Medication + HBO No. (%)	Intravenous Medication No. (%)	Intravenous Medication + HBO No. (%)	
Improvement	3 (17)	5 (21)	1 (17)	0 (0)	9
Stable	9 (50)	6 (25)	1 (17)	2 (28)	18
Unstable	4 (22)	7 (29)	4 (66)	2 (29)	17
Unchanged	2 (11)	6 (25)	0 (0)	3 (43)	11
Worse	0 (0)	0 (0)	0 (0)	0 (0)	0
Total	18	24	6	7	55

Note: Minimum follow-up period, 3 months after therapy.

HBO = hyperbaric oxygen.

Many other different treatment modalities also can be considered for patients suffering from tinnitus (e.g., psychosomatic treatment, autogenous training, acupuncture, tinnitus masker, physical therapy, neural treatment, and tinnitus retraining treatment). Our results help to explain the importance of beginning the treatment of patients suffering from tinnitus as early as possible (i.e., in the acute stage).

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