



Residual tinnitus after the medical treatment of sudden deafness

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ABSTRACT

Objectives: Some patients with sudden sensorineural hearing loss (SSNHL) are frustrated by residual tinnitus even after accomplishment of the treatment for SSNHL. In the present prospective study, we examined patients' backgrounds of sex, laterality and age together with changes in hearing level and the tinnitus score after the onset of SSNHL to determine the prognostic factors of residual tinnitus after the final day of medical treatment for SSNHL.

Methods: Forty-four patients with SSNHL were all treated with systemic administration of steroids for 2 weeks and oral intake of vasoactive drugs and vitamin B12 for 6 months before accomplishment of the treatment for SSNHL. The hearing improvement rate (HIR) was determined by comparing the hearing level before and 6 months after the start of treatment. Tinnitus was subjectively evaluated by the tinnitus scoring questionnaire before, 6 and 24 months after the start of treatment. The score of a five-step evaluation of subjective tinnitus feelings, "loudness", "duration" and "annoyance", was recorded. **Results:** HIR was significantly correlated with tinnitus score improvement (TSI) in "duration" at 6 months after the start of treatment compared with before treatment. The tinnitus score of all 3 items was significantly improved 6 months after the start of treatment compared with that before treatment but it was not significantly changed between 6 and 24 months after the start of treatment. TSI in "duration" between 6 and 24 months was significantly correlated with the patients' age and HIR using multiple regression analysis.

Conclusion: According to the tinnitus scoring questionnaire, "duration" is the most reliable item for subjective evaluation of tinnitus accompanied by SSNHL. Generally, subjective feelings for residual tinnitus 6 months after the start of treatment for SSNHL are supposed to be almost the same, even at the 24th post-treatment month. Especially, younger patients with better hearing improvement are predicted to achieve further improvement of tinnitus between 6 and 24 months after the start of treatment.

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1. Introduction

Sudden sensorineural hearing loss (SSNHL) is a common inner ear disease defined as a sensorineural hearing loss of 30 dB or worse in 3 consecutive speech frequencies with sudden onset [1,2]. Its incidence is estimated to range from 5 to 20 per 100,000 population [2]. SSNHL is idiopathic and is a syndrome that is

composed of several different causes as follows: viral infection of the labyrinth or cochlear nerve, vascular insults, intralabyrinthine membrane rupture and perilymphatic fistula [1].

According to the previous literatures, tinnitus has been reported to accompany SSNHL in 70–90% of patients [2–4]. In our previous study, 88% of SSNHL patients complained of tinnitus [5]. Some patients are very frustrated by residual tinnitus even after accomplishment of the treatment for SSNHL. They often ask doctors about the prognosis of residual tinnitus at the final day of medical treatment for SSNHL. In the present study, we examined patients' backgrounds of sex, laterality and age together with changes in hearing level using pure-tone audiometry (PTA) and tinnitus level using the tinnitus scoring questionnaire (TSQ) [6] after the onset of SSNHL to determine the prognostic factors of residual tinnitus after the final day of medical treatment for SSNHL.

Abbreviations: HIR, hearing improvement rate; PTA, pure-tone audiometry; SSNHL, sudden sensorineural hearing loss; TSI, tinnitus score improvement; TSQ, tinnitus score questionnaire.

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Table 1
The modified criteria of sudden deafness with vertigo.

Unilateral peripheral vestibular disorder with sudden onset of:
1. Unilateral sensorineural hearing disturbance with or without tinnitus
2. Severe prolonged rotational vertigo (direction of fall toward lesioned ear)
3. Horizontal rotatory spontaneous nystagmus (direction of fast phase away from the lesioned ear)
4. Vomiting or nausea
5. All the other known diseases including central lesions should be ruled out

We diagnosed 44 patients as sudden deafness with vertigo according to the modified criteria [7] presented by the Health Science Research Grant for Specific Disease of the Ministry for Health and Welfare, Japan [8].

2. Patients and methods

The present study was approved by the Ethics Committee of Osaka Rosai Hospital (certificate number: 9751). Informed written consent obtained from each patient before entering the study.

Charts of 44 consecutive patients, who were diagnosed as SSNHL accompanied by vertigo according to the modified criteria in Table 1 [7] based on the previous one [8] and hospitalized for treatment at the Dizziness and Vertigo Section of the Department of Otolaryngology in Osaka Rosai Hospital and Osaka University Hospital from 1997 to 2010, were reviewed in the present prospective study (23 females and 21 males; mean age, 49.9 years; range, 15–80 years). Patients with SSHNL with no initial tinnitus or Meniere’s disease were carefully excluded from this study. All of the patients underwent PTA, electro-nystagmography (ENG) and magnetic resonance imaging (MRI) for the purpose of excluding possible retrocochlear lesions, including demyelinating diseases at the first visit. All of the treatments started within 7 days after the onset (2.6 ± 1.5 days), including bed rest and intravenous applications of hydrocortisone sodium succinate (from 500 mg/day with dose reductions of 200 mg every 3 days to zero) and lasted for 2 weeks [1,9]. Subsequently, vasoactive drugs and vitamin B12 were

Table 2
Tinnitus scoring questionnaire by the Tinnitus Research Group of Japan Audiological Society in 1993.

Parameter	Score				
	1	2	3	4	5
Loudness	Very quiet	Quiet	Medium	Loud	Very loud
Duration	Rare	Less often	Often	Very often	Constant
Annoyance	Not at all	Slightly	Frequent	Always	Very much

The nature and severity of tinnitus were evaluated in 5 steps (from 1 to 5) in the following 3 different categories of subjective tinnitus feelings: “loudness”, “duration” and “annoyance”.

taken three times daily for approximately 6 months after leaving the hospital (Fig. 1).

Hearing recovery was determined by comparing audiometric results at the first visit (2.6 ± 1.5 days; pre-treatment: pt-0 m) with the next visit approximately 6 months later, when hearing function was supposed to be completely fixed (6.5 ± 1.4 months; post-treatment 6 months: pt-6 m) (Fig. 1). The hearing improvement rate (HIR) was used as a credible parameter for hearing recovery of SSNHL [1,9,10]. Hearing gain was the absolute value of changes in the mean hearing levels of 250, 500, 1000, 2000 and 4000 Hz from pt-0 m to pt-6 m. HIR was defined as the result of hearing gain divided by the difference between mean initial hearing levels in the affected and unaffected ear, multiplied by 100.

Tinnitus was subjectively evaluated by the TSQ according to the Tinnitus Research Group of Japan Audiological Society in 1993 (Table 2) [6]. A five-step evaluation score from 1 to 5 for the 3 items of subjective tinnitus feelings, “loudness”, “duration” and “annoyance”, was evaluated in patients at the first visit (2.6 ± 1.5 days; pt-0 m), the next visit 6 months later (6.5 ± 1.4 months; pt-6 m) and the final visit 24 months later (24.4 ± 2.1 months; pt-24 m) (Fig. 1). It is very important for neuro-otologists to inform patients with SSNHL regarding prognosis of residual tinnitus at the final day of medical treatment for SSNHL. Therefore, we examined the correlation

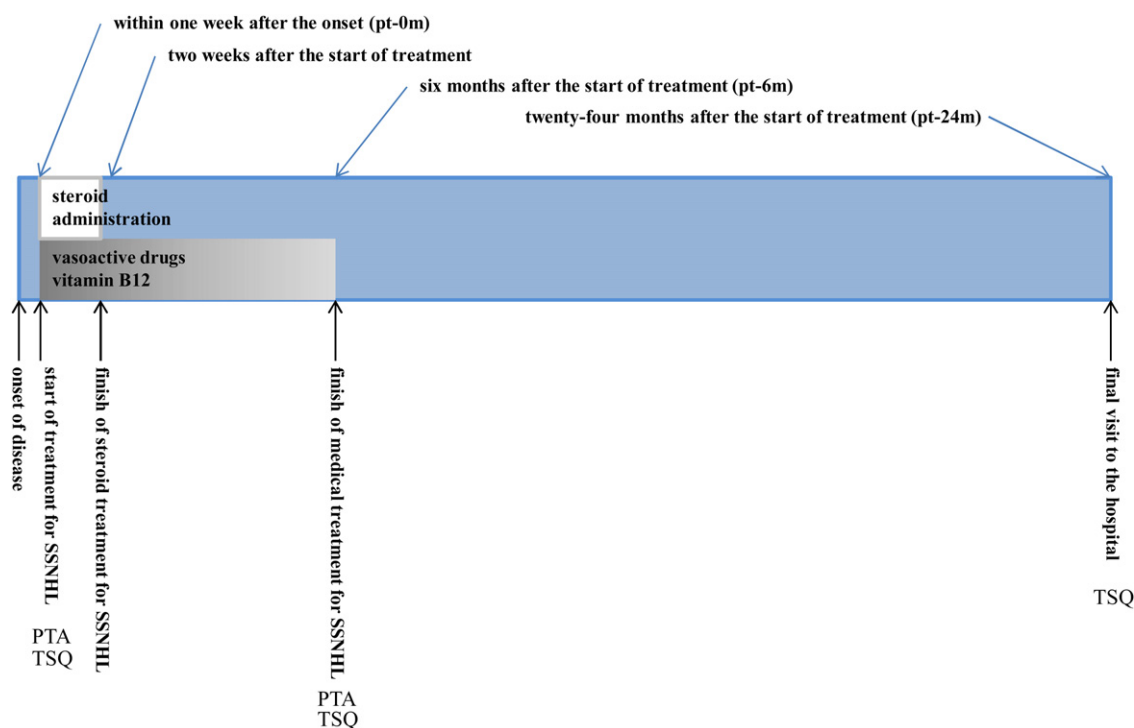


Fig. 1. Schedules of treatments and examinations in the present prospective study. SSNHL, sudden sensorineural hearing loss; PTA, pure-tone audiometry; and TSQ, tinnitus scoring questionnaire. Horizontal axis: time course after the onset of SSNHL.

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