



Diagnosis and treatment of sudden sensorineural hearing loss

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Abstract

Nationwide epidemiological surveys of idiopathic sudden sensorineural hearing loss (SSNHL) have been performed five times by the Research Committee of the Ministry of Health and Welfare or the Ministry of Health, Welfare and Labour in Japan. These surveys included patients who had SSNHL in 1972, 1987, 1993, 2001, and 2012. Using the criteria for the grading of hearing loss in SSNHL or the criteria for grading the degree of hearing recovery after SSNHL established by the Research Committee, we compared the outcomes of SSNHL between the five nationwide surveys. The results

revealed that the outcomes of SSNHL have not changed in the past 40 years. In 1972, 88% of patients received steroids, but none received prostaglandin E₁ (PGE₁). The use of PGE₁ has increased since the 1980s, but its effect on SSNHL may not be significant. Intratympanic steroid injection has been introduced recently for the treatment of SSNHL, but it does not seem to be used widely in Japan. Intratympanic therapy that can reduce the total amount of steroids administered will be used more frequently if the true effects and indications for this therapy are known. Elucidation of the etiologies of SSNHL and development of treatments specific for these etiologies are expected.

Key words: Sudden deafness; Grading system; Initial hearing level; Final hearing level; Treatment method; Nationwide epidemiological survey

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Core tip: Nationwide epidemiological studies of sudden sensorineural hearing loss (SSNHL) were performed five times between 1972 and 2012 in Japan and have revealed that the recovery rate of SSNHL has not improved for 40 years. Elucidation of the etiologies of SSNHL and development of treatments specific for these etiologies are expected.

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INTRODUCTION

According to a recent epidemiological study of idiopathic sudden sensorineural hearing loss (SSNHL) in Japan, the outcome of SSNHL has not changed in the

Table 1 Criteria for the grading of hearing loss in sudden sensorineural hearing loss

Grade 1	PTA < 40 dB
Grade 2	40 dB ≤ PTA < 60 dB
Grade 3	60 dB ≤ PTA < 90 dB
Grade 4	90 dB ≤ PTA

Evaluation of the initial audiogram should be performed within 2 wk of onset. PTA: Arithmetic mean of the five frequencies: 250, 500, 1000, 2000, and 4000 Hz.

Table 2 Final grades of initial grade 4 cases in five nationwide sudden sensorineural hearing loss surveys in Japan *n* (%)

	1972	1987	1993	2001	2012
Grade 1	26 (14)	49 (18)	70 (18)	25 (15)	5 (21)
Grade 2	31 (16)	44 (17)	62 (16)	36 (22)	1 (4)
Grade 3	87 (46)	119 (45)	173 (43)	68 (41)	11 (46)
Grade 4	45 (24)	53 (20)	95 (24)	38 (23)	7 (29)
Total	189 (100)	265 (100)	400 (100)	167 (100)	24 (100)

The data for 1972, 1987, and 1993^[2], 2001^[3], and 2012^[1] are summarized.

past 40 years^[1]. Table 1 shows the criteria for grading SSNHL established by the Research Committee of the Ministry of Health and Welfare in Japan in 1988.

The grading system is also used to evaluate the final hearing level, which is measured when the hearing level becomes stable^[2,3]. Table 2 shows the distribution of the grades of the final audiograms for grade 4 cases at the initial audiogram in five nationwide surveys performed from 1972 through 2012^[1-3].

The outcome has not differed significantly between the five surveys. Classification of grades 1 and 2 at the final audiogram as the "good recovery group" and grades 3 and grade 4 at the final audiogram as the "poor recovery group" and analysis using the χ^2 test showed that the ratio of good to poor recovery has not differed significantly between any survey year. This suggests that the treatment results for the worst grade of SSNHL at the initial examination have not improved in the past 40 years.

TREATMENT METHODS

Table 3 shows the percentages of patients with SSNHL who were treated with steroids, vitamins, stellate ganglion block (SGB), hyperbaric oxygen therapy (HBO), or prostaglandin E₁ (PGE₁) in 1972, 1987, and 2001 in Japan^[3,4].

The use of PGE₁ has increased since the 1980s, but its effect on SSNHL may not be significant^[5-7]. Treatment methods for patients who had SSNHL in 2012 have not been investigated. However, steroids remain the main drugs for the treatment of SSNHL at present throughout the world. Intratympanic steroid injection has been introduced recently for the treatment of SSNHL^[8], but it does not seem to be used widely

Table 3 Percentages of patients who received steroids, vitamins, stellate ganglion block, hyperbaric oxygen therapy, or prostaglandin E₁ for sudden sensorineural hearing loss

	1972	1987	2001
Steroids	88%	93%	85%
Vitamins	88%	93%	92%
SGB	24%	27%	8%
HBO	3%	12%	11%
PGE ₁	0%	11%	33%

Data for 1972 and 1987^[4], and 2001^[3] are summarized. SGB: Stellate ganglion block; HBO: Hyperbaric oxygen therapy; PGE₁: Prostaglandin E₁.

in Japan. Intratympanic steroid injection may be used more frequently if the true effects and indications are known as it can reduce the total amount of steroids administered.

EVALUATION OF HEARING RECOVERY

Siegel's criteria^[9] or criteria determined by the Research Committee of the Ministry of Health and Welfare in Japan^[10] are used in the evaluation of hearing recovery after SSNHL. These criteria use both the final hearing level and the magnitude of the hearing gain (in dB). The percentage improvement is also used to evaluate the degree of recovery and is calculated by dividing the difference between the initial hearing level and final hearing level by the difference between the initial hearing level and opposite ear hearing level^[5]. Another method is used to obtain the percentage of the final hearing grade for each grade of the initial audiogram (Table 2)^[1-3]. Various factors are associated with the degree of hearing recovery including the initial hearing loss, shape of the audiogram, interval between the onset of SSNHL and initial visit to an ENT doctor, age, and other factors. It is recommended to use several methods for the evaluation of hearing recovery.

Future problems

To increase the recovery rate of SSNHL, it is essential to investigate the etiology of SSNHL, which is considered a multifactorial disease. 3-Tesla magnetic resonance imaging can be used to evaluate disruption of the blood-labyrinthine barrier by observing the contrast enhancement of the inner ear after intravenous injection of gadolinium contrast agents^[11-13]. Increased permeability of the blood vessels is closely associated with inflammation. Whether the effects of steroids with anti-inflammatory function vary according to the condition of the blood-labyrinthine barrier should be settled in future. Development of intratympanic therapy or drug-placement therapy in the round window niche is expected^[14-16].

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