DIAGNOSIS AND TREATMENT OF SUDDEN SENSORINEURAL HEARING LOSS: LITERATURE REVIEW AND RESEARCH METHODS

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Abstract: *A distinguishing feature of sudden sensorineural hearing loss (SSNHL) is a rapid onset of sensorineural hearing impairment occurring within 72 hours, which is almost always unilateral. Most cases are idiopathic, and the degree of hearing loss significantly affects the prognosis for recovery. The aim of this study was to evaluate the effectiveness of steroid and antiviral therapy in the treatment of idiopathic sudden sensorineural hearing loss. We conducted a retrospective study of patients who presented to a tertiary academic specialty medical center. A total of 51 patients were examined. All patients received a standardized treatment regimen. Our treatment protocol resulted in a hearing recovery rate that exceeded the rate of spontaneous recovery. Antiviral therapy and extended steroid treatment duration may contribute to improved recovery outcomes.*

Keywords: *sudden sensorineural hearing loss, treatment, diagnosis.*

Introduction. The diagnosis and treatment of sudden sensorineural hearing loss (SSNHL) have remained challenging for clinicians for decades. SSNHL is believed to affect approximately 1 in 10,000 people annually [2,5,8]. Although SSNHL is a well-recognized condition, there is no universally accepted definition or treatment protocol. Furthermore, despite extensive evaluation, the etiology can only be determined in 10–15% of cases [1,3,10]. Viral infections, vascular disorders, and ruptures of cochlear membranes are among the factors associated with SSNHL or are suspected to be possible causes [4,9,11].

Numerous factors hinder the development of standardized definitions and treatment protocols for SSNHL [12,15]. Limited understanding of the pathophysiology of the disease contributes to the lack of effective treatment. It has become evident that this disorder does not result from a single disease process. An additional complicating factor is the high rate of spontaneous recovery [5,6,7,13]. According to most studies, spontaneous recovery occurs in 45% to 65% of patients. In this study, we present the treatment of idiopathic SSNHL using a combination of steroid and antiviral therapy.

Methods. A retrospective chart review was conducted to identify patients treated for idiopathic sudden sensorineural hearing loss (SSNHL). Only patients who presented with a complaint of sudden hearing loss were included. The term "sudden" was limited to cases where hearing loss occurred instantly or developed within no more than three days. SSNHL was defined as a hearing loss of 30 dB or more affecting at least three frequencies. All patients were examined within seven days of the onset of hearing loss.

The medical records of all patients diagnosed with SSNHL from 2023 to the present were reviewed at the Department of Otorhinolaryngology of Samarkand Medical University. Patients in whom no identifiable cause of SSNHL was found were considered to have idiopathic SSNHL. Medical records of patients who underwent evaluation for idiopathic SSNHL were selected. Records lacking follow-up audiometric testing were excluded. The remaining 51 medical records were thoroughly analyzed. Demographic data, including age and gender, were recorded. The course of the illness, consultations with other specialists, and use of medications prior to presentation were documented. Attention was paid to any history of otologic, vascular, or autoimmune diseases prior to presentation. The charts were also reviewed for smoking, alcohol use, and other chronic illnesses. All patients provided a full medical history and details about the current condition during the initial visit. The presence of tinnitus or vertigo was also noted. A comprehensive neurotological examination was included in the physical assessment.

Each patient presenting with sudden hearing loss underwent audiological evaluation within 12 hours of the initial visit, with the majority being tested within 2 hours.

Following the diagnosis of idiopathic SSNHL, the treatment protocol was initiated. Most patients began treatment within 6 hours of the first visit. The treatment regimen was the same for all patients and none had received prior treatment. All patients diagnosed with idiopathic SSNHL were prescribed a three-week course of steroids (see Table 1). In addition, they received a one-week course of valacyclovir (500 mg three times daily) and a three-week course of famotidine (20 mg twice daily) to prevent gastrointestinal complications.

Table 1.

Three-week steroid course with dose reduction.

DAYS	DEXAMETHASONE (MG)	DOSAGE SCHEDULE
0-14	4	4 times a day
15-16	1	3 times a day
17-18	0.5	3 times a day
19-20	0.5	2 times a day
21	0.5	1 time a day

Follow-up Visits Patients were scheduled for follow-up visits two weeks after the start of treatment, with an audiogram performed on the same day as the visit. Subjective changes in hearing were recorded during the second visit. The course of treatment and repeat audiograms were reviewed. All patients diagnosed with idiopathic SSNHL underwent magnetic resonance imaging (MRI) of the internal auditory canal to rule out retrocochlear damage within one month of diagnosis. After the second visit, patients were asked to return one month later for a follow-up audiogram.

Variables Analysis Variables that may influence recovery in SSNHL were analyzed. These included the patient's age, time since the onset of symptoms, dizziness, tinnitus, gender, lateralization, and audiogram type. Patients were divided into two groups: those under 40 years of age and those over 40 years. The time since the onset of symptoms was classified as within 3 days or later. A history of subjective movement occurring simultaneously with hearing loss was used to determine the presence of dizziness.

Audiograms were classified into 4 types of sensorineural hearing loss: ascending (13 patients, 25%), descending (27 patients, 53%), mid-frequency (4 patients, 8%), and profound hearing loss (7 patients, 14%). Descending audiograms showed a greater loss at 8 kHz compared to 4 kHz. Ascending audiograms showed the opposite. Mid-frequency loss was displayed as a "U-shaped" pattern on the audiogram. Finally, sensorineural hearing loss greater than 90 dB at all frequencies was considered profound hearing loss.

Follow-up Audiograms Follow-up audiograms were performed two weeks after the start of treatment in most cases. In four of the selected medical records, post-treatment audiograms were conducted more than six months after the treatment course ended. These cases were included in the study; however, analysis of the data without these patients did not show significant differences in outcomes. Due to the lack of pre-treatment audiograms before the onset of SSNHL, hearing in the unaffected ear was used as the normal comparison. A recovery was defined as the return of half of the difference between the affected and unaffected ears.

Results. Out of 51 patients, 30 (59%) were male and 21 (41%) were female. The right ear was affected in 20 (39%) patients, and the left ear in 31 (61%) patients. Gender and the side of the affected ear did not have a statistically significant impact on recovery ($P > 0.05$).

37 (73%) patients reported hearing recovery at follow-up, and repeat audiograms confirmed the improvement in results. No deterioration in hearing, tinnitus, or dizziness was reported after treatment. Additionally, no complications related to the treatment protocol were observed.

The average age of participants was 49 years, with a range from 19 to 81 years. A statistically significant ($P < 0.05$) increase in recovery levels was noted in the younger age group (Figure 1). All patients were evaluated and received treatment within 7 days of sudden sensorineural hearing loss onset. Each patient developed the maximum hearing loss within less than 8 hours. A statistically significant ($P < 0.05$) increase in recovery levels was observed in patients who received treatment within 3 days.

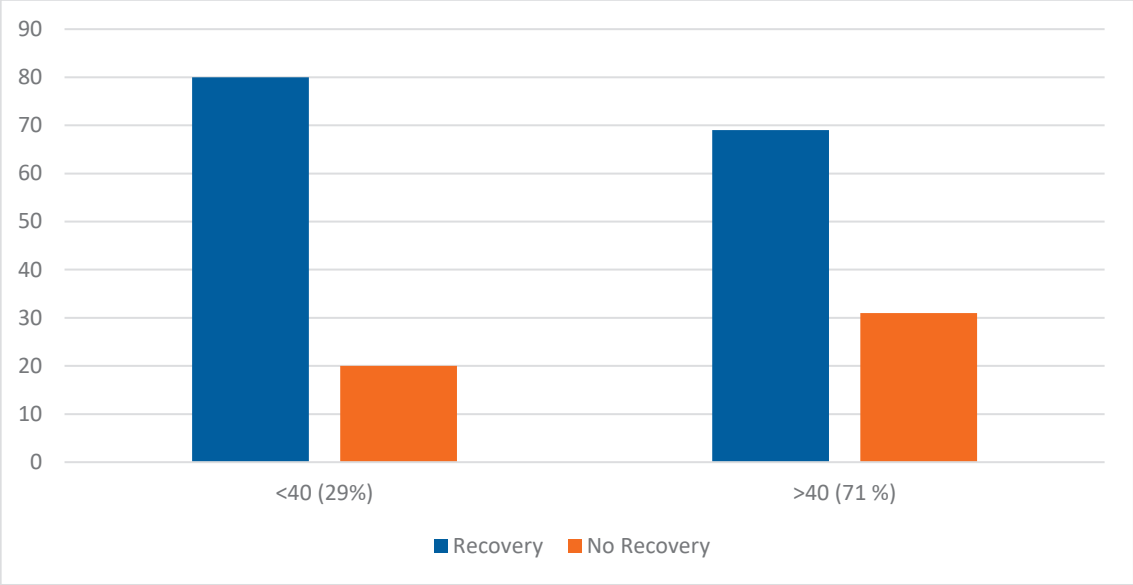

Fig. 1. Recovery and Age.

Dizziness and tinnitus did not have a statistically significant impact on recovery ($P > 0.05$) (Fig. 2). Treatment of patients with hearing loss in the mid frequencies, as well as those with descending and ascending audiogram types, resulted in a statistically significant level of recovery ($P < 0.05$) (Fig. 3).

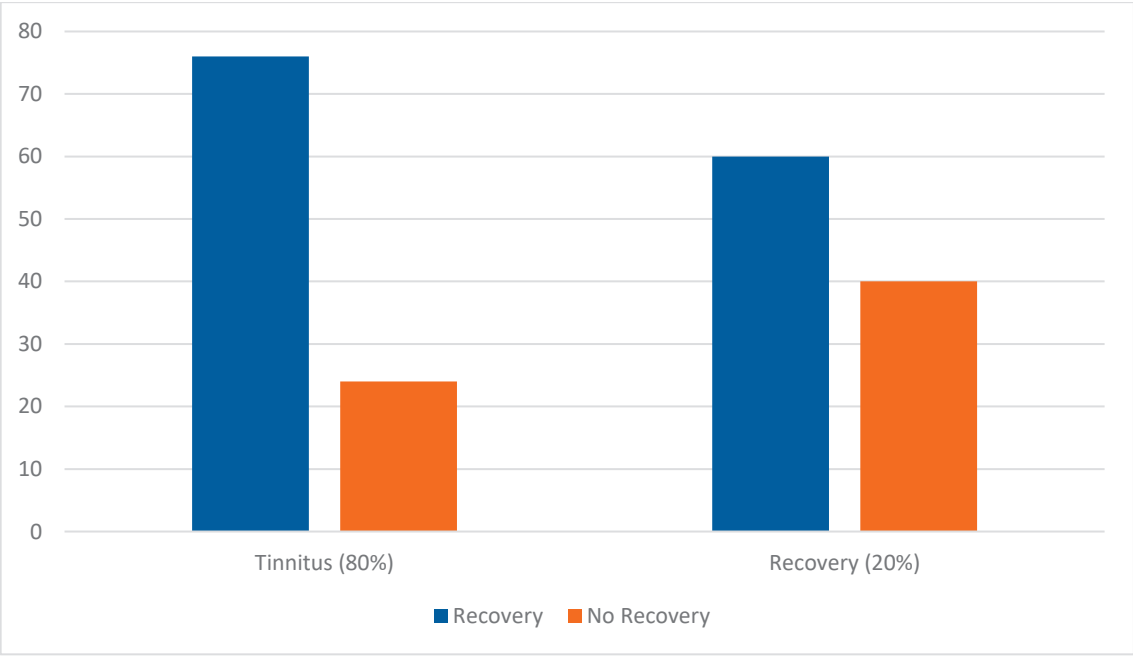

Fig. 2. Recovery and Tinnitus.

As mentioned earlier, the data were treated as dichotomous, non-parametric variables, with the exception of the age variable. A non-parametric analysis of repeated measures was conducted, resulting in a chi-square value of 194.23 (df = 6) ($P < 0.001$). Post-hoc Tukey's multiple comparisons test revealed that the outcome was significantly influenced by age, the time of onset of hearing loss, and the type of audiogram. However, the outcome was not influenced by gender, dizziness, tinnitus, or the side of the affected ear ($P > 0.05$).

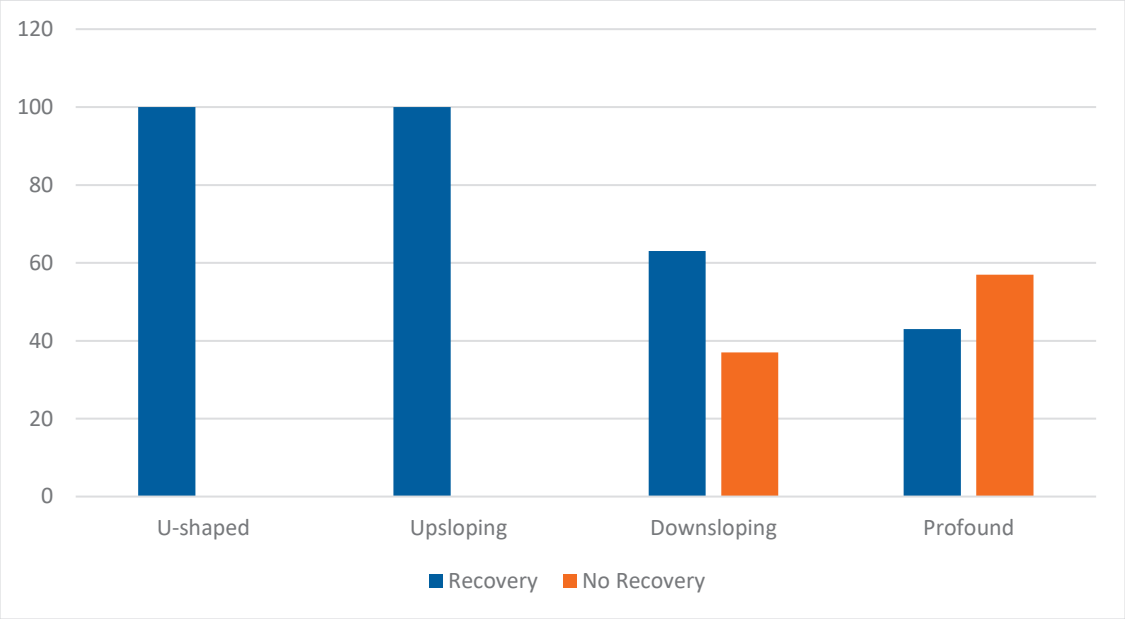

Fig. 3. Recovery and Audiogram Type.

Discussion. Research on idiopathic sudden sensorineural hearing loss (SSHL) has had limited success in establishing a standard definition and treatment protocols. This is primarily due to the rarity of the condition in otological practice, the lack of precise etiological classification, and the high rate of spontaneous hearing recovery. In this case series, we presented a group of patients who presented with complaints of sudden hearing loss and were diagnosed with idiopathic SSHL. We defined SSHL as a hearing loss of at least 30 dB across three adjacent frequencies within 3 days or less, according to the description by Wilson and colleagues. In our study, all patients experienced the maximum hearing loss within 8 hours.

Overall, our treatment protocol resulted in a recovery rate of 73%, which is higher than the rate of spontaneous recovery. We also showed that patients younger than 40 years old had a statistically significantly higher recovery rate ($P < 0.05$). Therefore, age is an important prognostic factor for recovery in our study.

The time from the onset of hearing loss to seeking medical help also proved to be a significant prognostic factor. In our study, all patients were examined within 7 days. Most other studies have shown that seeking help later than 7–10 days is associated with worse outcomes. It is suggested that this is related to the effect of self-selection—patients with rapid spontaneous remission do not seek medical attention. In our study, treatment started within 3 days of symptom onset resulted in significantly better outcomes.

The frequency of dizziness and tinnitus in our study was comparable to that reported by other authors. Contrary to previous reports, dizziness in our study was not a prognostic indicator of a poor outcome. The reasons for this remain unclear—possibly due to differences in patient selection criteria, patient population, or the specifics of the treatment protocol.

We achieved 100% hearing recovery in patients with mid-frequency hearing loss. In patients with profound hearing loss, no treatment benefit was observed—the recovery rate was similar to the spontaneous recovery rate.

Ascending audiograms were previously associated with a more favorable prognosis. All patients with ascending hearing loss in our study recovered after treatment. In our study, patients received a steroid course with gradual dose reduction over 3 weeks. It is possible that the longer steroid course explains the better outcome compared to placebo.

Furthermore, a recent randomized double-blind placebo-controlled multicenter study showed that antiviral medications did not provide additional benefits over steroids alone in the treatment of idiopathic SSHL. However, viral infections are believed to play a significant role in the etiology of SSHL. It is possible that certain viral strains, prevalent in our region, are more responsive to the proposed treatment, while results may differ in other regions. Additionally, that study was conducted in a multicenter setting with multiple doctors, which complicates ensuring the same level of care for all SSHL patients.

We obtained a better overall hearing recovery rate compared to spontaneous recovery. However, in our study, all patients with ascending and mid-frequency hearing loss recovered after treatment, and 91% of patients with dizziness also had a positive outcome.

The treatment protocol in our study included a three-week steroid course with gradual dose reduction only in the last week. It is possible that the longer course of therapy explains the differences in recovery outcomes in our patients. The improved results may also be linked to the use of antiviral therapy alongside steroids, as most of the studies we analyzed did not use antiviral medications. Given that drugs such as acyclovir have an extremely low risk of side effects, we recommend treating patients with idiopathic SSHL using a combination of steroid and antiviral therapy.

Conclusion. We presented a clinical case series involving 51 patients with idiopathic sudden sensorineural hearing loss (SSHL), who were treated with steroids and antiviral medications. It was demonstrated that age, the time between the onset of symptoms and the initiation of treatment, as well as the type of audiogram, were statistically significantly associated with treatment outcomes. Gender, the presence of dizziness, tinnitus, and the side of the affected ear did not have a statistically significant impact on the degree of hearing recovery.

Furthermore, we showed that, contrary to previous studies, our treatment protocol was effective in all patients with ascending and mid-frequency types of SSHL. Additionally, according to our data, the presence of dizziness is no longer a sign of poor prognosis.

Further prospective studies are needed to evaluate the effectiveness of each component of the treatment regimen, as well as the impact of changes in steroid dosage and duration of treatment. As knowledge about the etiology of SSHL accumulates, more targeted treatment methods may be applied, replacing the current empirical approaches.

Until then, we recommend treating patients with idiopathic SSHL using steroid and antiviral therapy, as our study showed improved outcomes with this regimen.

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