



Is the time from the onset to the treatment a prognostic indicator for hearing recovery in idiopathic sudden sensorineural hearing loss?

İdiyopatik ani sensörinöral işitme kaybında işitmenin iyileşmesinde başlangıçtan tedaviye kadar geçen süre prognostic bir belirteç midir?

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ABSTRACT

Objectives: This study aims to investigate whether the time from the onset of symptoms to the start of treatment is a prognostic indicator in patients with idiopathic sudden sensorineural hearing loss (ISSNHL).

Patients and Methods: In this study, 96 patients (58 males, 38 females; mean age 37.8±2.5 years; range 16 to 67 years) who were diagnosed with ISSNHL in our clinic between January 1992 and April 2010 were retrospectively analyzed. All patients were treated with dextran 40 (rheomacrodex), pentoxifyllin, vitamin B complex and vitamin C regimen over 10 days with hospitalization and bed rest. The patients were tested by pure-tone audiometry. Audiograms were obtained on alternate days and at the end of the treatment.

Results: There was a complete recovery in 45 (60%) of 75 patients whose treatment was started in the first seven days, while a partial recovery was observed in 17 (22.66%) and no recovery was observed in 13 (17.33%). There was a complete recovery in two (9.52%) of 21 patients whose treatment was started after the eighth day, while a partial recovery was observed in seven (33.33%) and no recovery was observed in 12 (57.14%).

Conclusion: Our study results suggest that treatment outcomes are better in the patients presenting to hospital at an early stage of loss of hearing.

Keywords: Hearing recovery; idiopathic sudden sensorineural hearing loss; prognostic factor.

ÖZ

Amaç: Bu çalışmada idiyopatik ani sensörinöral işitme kaybı (İASNİK) olan hastalarda semptomların başlangıcından tedaviye başlama zamanına kadar geçen sürenin prognostik bir belirteç olup olmadığı araştırıldı.

Hastalar ve Yöntemler: Bu çalışmada Ocak 1992 - Nisan 2010 tarihleri arasında kliniğimizde İASNİK tanısı konmuş 96 hasta (58 erkek, 38 kadın; ort. yaş 37.8±2.5 yıl; dağılım 16-67 yıl) retrospektif olarak değerlendirildi. Hastaların tümü 10 gün süreyle hastane yatışı ve yatak istirahati ile dekstran 40 (rheomacrodex), pentoksifilin, B vitamin kompleksi ve C vitamin rejimi ile tedavi edildi. Hastalar saf ton odyometrisi ile test edildi. Odyogramlar farklı günlerde ve tedavi sonunda elde edildi.

Bulgular: Tedavilerine ilk yedi gün içerisinde başlanan 75 hastanın 45'inde (%60) tam iyileşme, 17'sinde (%22.66) kısmi iyileşme görüldü, 13'ünde (%17.33) ise herhangi bir iyileşme gözlenmedi. Tedavilerine sekizinci günden sonra başlanan 21 hastanın ikisinde (%9.52) tam iyileşme görülürken, yedisinde (%33.33) kısmi iyileşme görüldü, 12 hastada (%57.14) ise herhangi bir iyileşme gözlenmedi.

Sonuç: Çalışma sonuçlarımız, işitme kaybının erken döneminde hastaneye başvuran hastalarda tedavi sonucunun daha iyi olduğunu göstermektedir.

Anahtar Sözcükler: İşitme iyileşmesi; idiyopatik ani sensörinöral işitme kaybı; prognostik faktör.



To our knowledge, there is no universal definition of idiopathic sudden sensorineural hearing loss (ISSNHL). In this paper, we define ISSNHL as an idiopathic hearing loss (HL) of sensorineural origin, greater than 30 decibel (dB) in three contiguous frequencies that occurs in less than three days.^[1] The incidence varies between 5 to 20 in 100,000 cases. Approximately 32-65% of the patients gain some hearing spontaneously.^[2,3]

The etiology of this disorder is not well known and a standard definition of the condition has not yet been established. Different theories have been developed trying to clarify the etiology including infectious,^[4] vascular,^[5-7] and autoimmune theories,^[8] and the theory of rupture of membranes of the inner ear.^[9] Because the exact cause of the disease is unclear, many regimens have been proposed for the treatment of SSNHL. Steroids, histamines, carbogen, low molecular weight dextran, diuretics, heparin, triiodobenzoic acid derivatives, antiviral agents, calcium channel blockers and piracetam are the most common agents used in the treatment of ISSNHL.^[10-16]

Several authors have demonstrated the prognostic indicators of hearing recovery of ISSNHL. Bly suggested that the severity of HL, the interval between HL and evaluation of the patient, elevated erythrocyte sedimentation rate and presence of vertigo were the most significant predictors of response to the treatment. Age of the patients (>60 and <15) is another indication for prognosis.^[17] Many of the studies have shown that the time between onset of symptoms and initiation of treatment is one of the most important predictors of outcome.^[12,17]

The aim of this study was to investigate the relation between the time from the onset of symptoms to the initiation of treatment and prognosis in patients with ISSNHL treated in our department.

PATIENTS AND METHODS

A retrospective review of the patients diagnosed with ISSNHL at the Department of Otolaryngology-Head and Neck Surgery, Cumhuriyet University Faculty of Medicine between January 1992 and April 2010 was performed. Ninety-six patients (58 males, 38 females; mean age 37.8 ± 2.5 years; range 16 to 67 years) with sudden HL that met the following criteria were included in the study: Sensorineural HL of >30 dB in three consecutive frequencies within 72h, no previous treatment, no obvious cause for HL, non-fluctuating HL, arithmetic mean of hearing thresholds at 250, 500, 1000, 2000 and 4000 Hz over 30 dB and initiation of treatment within 30 days of HL. Exclusion criteria were the presence of acute or chronic otitis media, fluctuating HL, previous otologic surgery, head trauma, acoustic trauma, barotrauma, autoimmune HL, recent application of radiotherapy and/or chemotherapy which may induce HL, labyrinthitis, congenital HL, presence of herpes zoster oticus, recent use of ototoxic drugs and liver or renal dysfunction.

All the patients had been hospitalized and bed rest had been recommended in addition to medical therapy. Our standard treatment regimen consisting of dextran 40 (rheomacrodex), pentoxifylline, vitamin B complex and vitamin C had been given to the patients. Table 1 describes the treatment regimen in detail.

Table 1. Dose schedule of the treatment regimen

Medication	Days	Dose scheme
Rheomacrodex	1-10 days	8 mL/kg/day intravenous infusion
Pentoxifylline	1-10 days	
	1-2 days	100 mg intravenous infusion
	3-4 days	200 mg intravenous infusion
	5-6 days	300 mg intravenous infusion
	7-10 days	400 mg intravenous infusion
Vitamin B complex	1-10 days	2 mL/day intravenous infusion
Vitamin C	1-10 days	500 mg/day intravenous infusion

Vitamin B complex: Vitamin B1 25 mg; Vitamin B2 2 mg; Vitamin B6 5 mg; Vitamin B12 15 mcg; Nicotinamide 50 mg; Calcium pantothenate.

All patients had been tested by pure-tone audiometry (PTA) (Interacoustics AC-5 and Interacoustics AC-40 clinic audiometer, Denmark) in a soundproof booth. Pure-tone hearing thresholds had been used as a control parameter before and after treatment. Audiograms had been obtained before the treatment, every two days during the treatment and at the end of the treatment (10th day). The hearing threshold had been evaluated as the average of the hearing thresholds at five different frequencies (250, 500, 1000, 2000 and 4000 Hz). In order to evaluate treatment outcomes, the patients had been divided into groups according to their hearing status. If the hearing threshold had dipped below 20 dB at 250, 500, 1000, 2000 and 4000 Hz after treatment, it had been accepted as 'complete recovery', while an improvement less than 10 dB in hearing threshold had been defined as 'no recovery' and a change between complete recovery and no recovery had been defined as 'partial recovery'.^[18,19]

Data were presented in numeric and percent form. Categorical data analysis was performed using chi square techniques or the Fisher exact test. Comparison between days before treatment and improvement was performed using the rank sum test. All statistical analysis was done with SPSS for Windows version 14.0 (SPSS Inc., Chicago, IL, USA) software program.

RESULTS

There was no statistically significant difference between age groups in terms of gender ($p>0.05$).

Patients who had presented during the initial three days of HL constituted 38.5% of all study patients while patients who presented between days 4-7 constituted 39.6%. 18.8% of patients presented between days 8-15 while 3.1% presented on the 16th day or later. Those who presented during the first seven days of HL constituted the majority (78.1%) of patients.

Patients were divided into four groups according to their thresholds of HLs (Figure 1). In the group composed of 33 patients with a hearing threshold of 31-40 dB before treatment, there was complete recovery in 18 (75%) of 24 patients whose treatment had been initiated in the first seven days. There was partial recovery in three (12.5%) and no recovery was

observed in three (12.5%) of the 24 patients. Complete recovery was observed in two (22.2%) of the nine patients whose treatment had been initiated after the first week while partial recovery was observed in two (22.2%) and no recovery was observed in five (55.5%) of these nine patients.

In the group composed of 24 patients with a HL of 41-50 dB before treatment, there was complete recovery in 16 (76.2%) of 21 patients whose treatment had been initiated in the first seven days while partial recovery was observed in three (14.3%) and no recovery was observed in two (9.5%). Partial recovery was observed in one (33.3%) of the three patients whose treatment had been initiated after the first week while no recovery was observed in the remaining two (66.6%).

The group with a HL of 51-60 dB consisted of 17 patients. There was complete recovery in six (50%) of 12 patients whose treatment had been initiated within the first seven days while partial recovery was observed in five (41.6%) and no recovery was observed in one (8.4%) of them. Partial recovery was observed in four (80.2%) of the five patients whose treatment had been initiated after the first week while no recovery was observed in one patient (20%).

In the group composed of 22 patients with a HL of 61 dB or more before treatment, there was complete recovery in five (27.7%) of 18 patients whose treatment had started in the first seven days while partial recovery was observed in six (33.3%) and no recovery was observed in seven (39%). No recovery was observed in four patients whose treatment had started after the first week with initial HL of ≥ 61 dB.

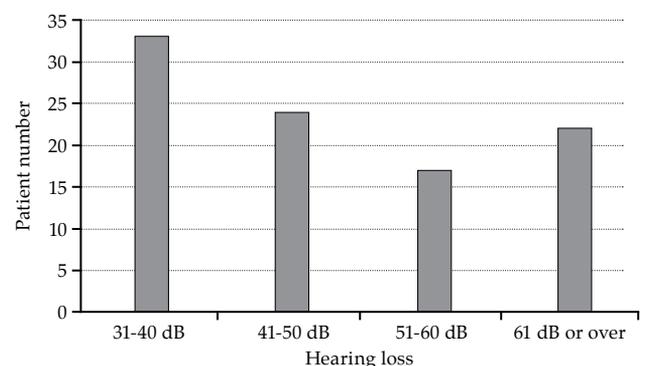


Figure 1. Distribution of patients according to their hearing loss.

When hearing recoveries were compared (Figure 2), there was no significant difference between those who had presented in days 0-3 and days 4-7 ($p>0.05$). The difference between those who had presented in days 8-15 and on the 16th day or later was significant, though ($p<0.05$). Also, a significant difference was found when hearing recovery of the patients who presented in days 0-3 and 4-7 were compared to the patients who presented in days 8-15 and on the 16th day or later ($p<0.05$).

Overall hearing recoveries of the patients are summarized in Figure 3. There was complete recovery in 45 (60%) of 75 patients whose treatment had started in the first seven days while a partial recovery was observed in 17 (22.66%) and no recovery was observed in 13 (17.33%) of them. There was complete recovery in two (9.52%) of 21 patients whose treatment had started after the eighth day while partial recovery was observed in seven (33.33%) and no recovery was observed in 12 (57.14%).

DISCUSSION

Many studies with different treatment protocols have been carried out to clarify the treatment of SSNHL. However, many factors such as severity of the HL, time between the onset of disease and initiation of treatment, presence of vertigo, the audiogram shapes and the hearing of the other ear can affect these treatment protocols.^[20] Lacosta et al.^[21] found a hearing recovery rate of 48% during the first seven days with steroid,

vasodilator and hemodilution treatment. In our study, overall hearing recovery rate was 86.2%, with a full recovery rate of 66% and partial recovery rate of 22.6%. The average HL recovery was 20.81 ± 2.90 dB, 20.83 ± 2.20 dB, 7.50 ± 2.83 dB and 1.33 ± 1.30 dB when the treatment was started in the first three days, in seven days, after the eighth day and after the 16th day, respectively. Based on these results, the highest HL recovery was observed in those whose treatments were started in the first seven days while the recovery rate was lower in those whose treatments were started after the second week. The lowest recovery rate was observed in those whose treatments were started after the 16th day. Consistent with our results, Mderris et al.^[22] and Zientalska et al.^[23] reported in different studies that HL recovery was higher when the treatment was started in the first week and lower when the treatment was started after the eighth day.

In a study of 746 cases, Sano et al.^[24] calculated average hearing thresholds in five different frequencies, grouped each day individually and investigated HL recovery rate according to the initial examination day. Consistent with our results, they found that HL recovery is much more unfavorable if the patient was seen after the ninth day. Gavalier et al.^[25] reported, also similar to our results, that the chance of recovery is higher during the initial days of HL. Byl^[17] reported a complete recovery rate of 56% when the patients were treated within seven

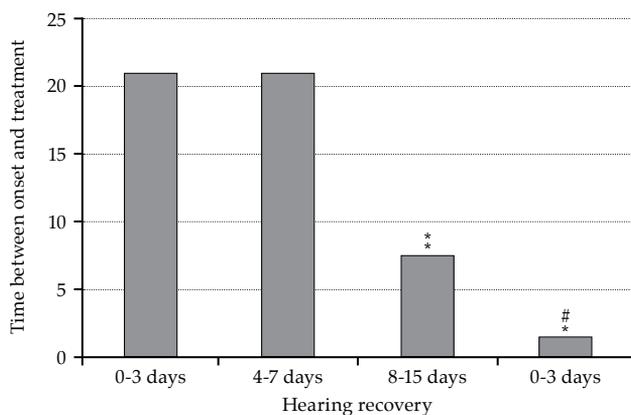


Figure 2. Hearing recovery according to time elapsed before initiation of treatment after hearing loss (in dB). * $p<0.05$ versus hearing recovery of 4-7 days and 0-3 days; ** $p<0.05$ versus hearing recovery of 4-7 days and 0-3 days; # $p<0.05$ versus hearing recovery of 8-15 days.

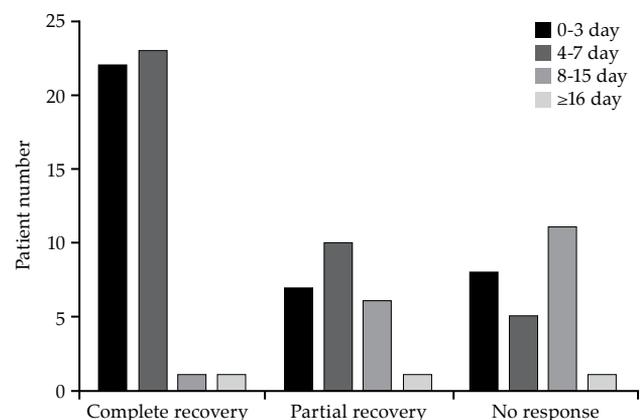


Figure 3. Overall hearing recovery of patients according to time passed before initiation of treatment after hearing loss.

days, but only 27% of those that the treatment had started 30 days or later had recovered completely.

Shaia and Sheehy^[26] reported better prognosis when the patient received treatment within one month. Considering the spontaneous course of the recovery occurring in approximately two thirds of the cases without treatment, usually within the first two weeks,^[27] no single study has evidenced clearly the beneficial effect of any early treatment.

Cvorović et al.^[20] reported 60% of the patients who received treatment within seven days from onset of symptoms had a significant recovery. This percentage, however, dropped to 40% if the patient received treatment more than seven days after onset. Conversely, no significant difference was detected in final outcome if the treatment was started within the first 24 hours or within the first week. These results suggest that it is not critical to begin the treatment of SSNHL immediately as an emergency. In this study, 451 patients (85%) received treatment within seven days after onset of symptoms, and 60% had significant recovery of hearing. This percentage dropped to 40% if the patient received treatment later than seven days after onset. The correlation between the interval from the onset of symptoms to the beginning of treatment and the absolute and relative hearing gain was weak but significant.

Experimental studies presented by Tabuchi et al.^[28] have shown that a 60-minute anoxia induced by pressing the labyrinthine artery led to irreversible lesions in the cochlea of guinea pigs. The conclusion could be that if ISSNHL is due to vascular interruption, then the treatment should begin within one hour after onset, an unrealistic goal not supported by clinical evidence. Also other authors have reported similar findings.^[29,30]

Some studies suggest that the patients referring to clinic within 10 days after the onset of SHL should be given treatment of SHL, whereas other studies suggest that the treatment could be started in 15 days.^[31,32] Moskowitz et al.^[33] reported that the cases that were treated in the first three days had a 68% of improvement, whereas this rate decreased to 11% in cases that were treated within seven days.

Narozny et al.^[34] concluded that a delay of 10 days before starting treatment was found to be the cutoff point for a poorer prognosis. On the other hand, the spontaneous recovery rate can mimic a positive effect of treatment in the early phase of therapy. In our study this point was not assessed, so other prospective studies on late treatment after initial failure of standard therapy are necessary.

Currently, oral, intravenous or transtympanic steroids are strongly recommended for the treatment of ISSNHL.^[1,20,33,35] Lately, we also use corticosteroids in at least one form in the treatment of ISSNHL, but since our initial patients were treated with a treatment regimen without corticosteroids, we excluded later patients that were treated with corticosteroids to homogenize the study group and eliminate the risk of a potential impact of treatment regimen on prognosis. Whatever the treatment regimen was, compared to the treatments started within the first 10 days, success rate was much lower in treatments started after 10 days. It has been reported that a treatment started after the second week has no meaning, active disease improves and damage becomes permanent during the said term.^[36,37] In our study, complete recovery was observed in 60% and partial recovery was observed in 22% of the cases whose treatment had started during the first seven days. In those whose treatments had started after the first seven days, complete recovery was observed in 9.5% while partial recovery was observed in 33.3%.

Conclusion

It was found that the time of presenting to hospital in ISSNHL is important in the prognosis. While recovery was observed in 62 (82.6%) of 75 patients who presented during the first seven days, no recovery was observed in 13 (17.3%). Recovery was observed in nine (42.8%) of the 21 patients who had presented after the eighth day while no recovery was observed in 12 (57.2%). The limitations of our study were not separating the patients according to their ages (due to the increase in data which would make the study more complicated). We also did not study the erythrocyte sedimentation rates, which are not used so often in our clinic. As a result, we believe that treatment outcomes are better when treatment is initiated at an early stage of the HL. For this reason, we think that SSNHL is

an otologic emergency that requires immediate treatment.

Declaration of conflicting interests

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