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Original Research Article

A Single-Center, Retrospective Study Assessing the Clinical Profile of Patients with Sudden Onset Sensorineural Hearing Loss

Sami Ahmad[1], Akbar Zaman[2], Mrinalini Raman[3], P. K. Lal[4]

[1] Senior Resident, Department of ENT, SKMCH, Muzaffarpur, Bihar, India
[2]Senior Resident, Department of ENT, SKMCH, Muzaffarpur, Bihar, India
[3]Assistant Professor, Department of ENT, SKMCH, Muzaffarpur, Bihar, India
[4]Associate Professor & HOD, Department of ENT, SKMCH, Muzaffarpur, Bihar, India

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Corresponding author: Dr. Akbar Zaman
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Abstract

Aim: The aim of the present study was to study clinical profile of patients with sudden onset sensorineural hearing loss at a tertiary hospital.

Methods: The Present study was single-center, retrospective study, conducted in Department of ENT, at SKMCH, Muzaffarpur, Bihar, India. We studied total 100 case records. Case records of patients with sudden onset sensorineural hearing loss examined from last one year were considered for present study.

Results: All patients were compared according to recovery status. Recovery was noticed in 40 patients (40%) while no or less than 50 % recovery was noticed in 60 patients (60%). Majority of patients were from 41-60 years age group (43%) followed by from 21-40 years age group (30%). In patients with recovery, mean age was 41.87 ± 9.34 years as compared to patients without recovery as 50.51 ± 10.78 years and difference was statistically significant ($p<0.05$). Gender was comparable among total patients as well as patients with or without recovery and difference was statistically not significant ($p>0.05$). Hypertension (35%), diabetes (20%), dyslipidemia (20%) and thyroid disorder (8%) were common comorbidities noted among patients. Vertigo was significant in patients without recovery (62.50%) as compared to patients with recovery (37.50%) and difference was statistically significant ($p<0.05$). Tinnitus was comparable in patients with recovery (40%) as well as patients without recovery (60%) and difference was statistically not significant ($p>0.05$). Degree of hearing loss was mild (8%), moderate (10%), moderately severe (20%), severe (25%) and profound (37%). Incidence of patients without recovery was increased with increase in severity of hearing loss and difference was statistically significant ($p<0.05$).

Conclusion: In patients with sudden onset sensorineural hearing loss age less than 40 years, no comorbidities, lesser degree of hearing loss, early (<14 days) initiation of treatment are factors associated with recovery.

Keywords: Sudden Onset Sensorineural Hearing Loss, Vertigo, Profound Hearing Loss, Prednisolone.

Introduction

Idiopathic sudden sensory neural hearing loss (ISSNHL) is characterized as an abrupt hearing loss of more than 30dB in three contiguous frequencies within 72 hours. [1] An earlier study reported that the incidence of ISSNHL in the Western

countries' population was estimated to 5–20 per 100,000 inhabitants. [2]

Despite extensive investigation, 90% of the SSNHLs are deemed idiopathic (ISSNHL). [3] ISSNHL is a heterogeneous disorder in terms of clinical symptoms, etiology, degree of hearing loss, audiogram configuration, time between hearing loss onset and treatment, and recovery prognosis. Although many studies concerning ISSNHL have been published, their methodological heterogeneity and small sample sizes undermine proper analysis and comparison of their results. [4] Further systematic evaluation with a large number of patients who are followed for a long period, including analysis of clinical and audiometric profiles and their correlation with hearing prognosis, is critical to allow the development of a pathophysiology-oriented diagnostic investigation and personalized treatment plan for patients with ISSNHL. Regarding age distribution, Rauch demonstrated that ISSNHL most frequently occurred in 43 to 53 years old patients. [5]

Regarding its etiopathogenesis exact cause is not known in most of the cases making "idiopathic" (ISSNHL) as usual prefix in diagnosis. However known local and systemic causes that can result SSNHL are always looked upon. Impaired cochlear blood circulation has been suggested to cause sudden hearing loss. [3,6] But the lack of clear relationships between SSHL and other vascular risk factors suggests multifactorial disease profile. [7,8] Also, hyperfbrinogenemia has been assumed as a risk factor to ISSNHL, and the relationship between hyperfbrinogenemia and ISSNHL has been emphasized in several clinical and animal experiments. [9,10]

Chronic sensorineural hearing loss (SNHL) accounts for roughly 90% of this sensory deficit and is likely caused by noise, chemical, viral, and aging insults with potentially debilitating effects. [11,12] In people with SNHL, audibility (loudness of sound) and intelligibility (clarity of words) deteriorate due to the aforementioned auditory insults. Recently, microcirculation disturbance has been hypothesized as the main etiology. Any disease interrupting the cochlear perfusion may eventually result in a reduction of the oxygen supply to cochlea and trigger ISSNHL. Cardiovascular and metabolic diseases such as hypertension, diabetes mellitus (DM) and hyperlipidemia, reduces the elasticity of blood vessels and induce the formation of atherosclerosis, thus causing microangiopathy. [13,14] Audiological evaluation provides a criterion for the diagnosis of ISSNHL; in the case of retrocochlear lesions, further investigations like imaging studies are necessary to rule out other causes like vestibular Schwannoma, cerebro-vascular accidents.

The aim of the present study was to study clinical profile of patients with sudden onset sensorineural hearing loss at a tertiary hospital.

Materials and Methods

The Present study was single-center, retrospective study, conducted in Department of ENT, at SKMCH, Muzaffarpur, Bihar, India. We studied total 100 case records. Case records of patients with sudden onset sensorineural hearing loss examined from last one year were considered for present study.

The diagnosis of all the patients had been made by experienced Otolaryngologists. Patient's demographic data, onset, and duration of hearing loss, associated symptoms, presence of cardiovascular risk factors and other co-morbid factors, findings of clinical examination, initial diagnosis were noted. Findings of various blood investigations such as complete haemogram, serum electrolytes, thyroid function tests, findings of initial audiogram, treatment received were documented. As per standard medical treatment, Tapering dose of oral

prednisolone for fourteen days was administered (60 mg/day for 5 days, followed by 50 mg/day for 3 days, followed by 40 mg for 2 day, followed by 30 mg for 1 day, followed by 20 mg for 1 day, followed by 10 mg for 1 day, and followed by 5 mg for 1 day), with oral pentoxifylline 400 mg twice per day. In all cases, the hearing assessment was done by pure tone audiometry on the day of presentation and weekly after treatment initiation until one month. The hearing improvement was evaluated based on the change in hearing threshold from the pre-treatment to the 1-month follow-up audiogram. Recovery was considered when post-treatment PTA that was ≥ 50% of the reference hearing level.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables was tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

Results

Table 1: General characteristics

Characteristics	Total (n=100) n%	With recovery (n=40) n%	Without recovery (n=60) n%	P value
Age in years				
≤ 20	5 (5)	4 (80)	1 (20)	
21-40	30 (35)	11 (36.66)	19 (63.34)	
41-60	43 (43)	15 (34.88)	28 (65.12)	
>60	17 (17)	7 (41.17)	10 (58.83)	
Mean Age (years)	47.66 ± 13.54	41.87 ± 9.34	50.51 ± 10.78	<0.05
Gender				
Male	48 (48)	18 (37.5)	30 (62.5)	>0.05
Female	52 (52)	20 (38.46)	32 (61.54)	
Comorbidity				
Hypertension	35 (35)	12 (34.28)	23 (65.72)	>0.05
Diabetes	15 (15)	6 (40)	9 (60)	>0.05
Dyslipidemia	20 (20)	6 (30)	14 (70)	>0.05
Thyroid disorder	8 (8)	3 (37.5)	5 (62.5)	>0.05
Autoimmune disease	1 (1)	0	1 (100)	0.00

All patients were compared according to recovery status. Recovery was noticed in 40 patients (40%) while no or less than 50 % recovery was noticed in 60 patients (60%). Majority of patients were from 41-60 years age group (43%) followed by from 21-40 years age group (30%). In patients with recovery, mean age was 41.87 ± 9.34 years as compared to patients without recovery as 50.51 ± 10.78 years and difference was statistically significant ($p<0.05$). Gender was comparable among total patients as well as patients with or without recovery and difference was statistically not significant ($p>0.05$). Hypertension (35%), diabetes (20%), dyslipidemia (20%) and thyroid disorder (8%) were common comorbidities noted among patients. We compared comorbidities among patients with or without recovery and difference was statistically not significant ($p>0.05$).

Table 2: Clinical features

Clinical features	Total (n=100) n%	With recovery (n=40) n%	Without recovery (n=60) n%	P value
Vertigo	40 (40)	15 (37.5)	25 (62.5)	<0.05
Tinnitus	80 (80)	32 (40)	48 (60)	>0.05

Vertigo was significant in patients without recovery (62.50%) as compared to patients with recovery (37.50%) and difference was statistically significant ($p<0.05$). Tinnitus was comparable in patients with recovery (40%) as well as patients without recovery (60%) and difference was statistically not significant ($p>0.05$).

Table 3: Audiogram curve

Audiogram curve	Total (n=100) n%	With recovery (n=40) n%	Without recovery (n=60) n%	P value
Ascending	15 (15)	7 (46.66)	8 (53.34)	0.016
Descending	40 (40)	16 (40)	24 (60)	
Flat, U-shaped, reverse U-shaped	45 (45)	20 (44.44)	25(55.55)	

Audiogram curve was flat, U-shaped, reverse U-shaped (45%) in majority of patients followed by descending (40%) and ascending (15%)

Table 4: Degree of hearing loss

Degree of hearing loss	Total (n=100) n%	With recovery (n=40) n%	Without recovery (n=60) n%	P value
Mild	8 (8)	3 (37.5)	5 (62.5)	0.012
Moderate	10 (10)	4 (40)	60 (60)	
Moderately Severe	20 (20)	8 (40)	12 (60)	
Severe	25 (25)	10 (40)	15 (60)	
Profound	37 (37)	15 (40.54)	22 (59.46)	

Degree of hearing loss was mild (8%), moderate (10%), moderately severe (20%), severe (25%) and profound (37%). Incidence of patients without recovery was increased with increase in severity of hearing loss and difference was statistically significant ($p<0.05$).

Table 5: Time to initiate treatment

Time to initiate treatment (days)	Total (n=100) n%	With recovery (n=40) n%	Without recovery (n=60) n%	P value
≤ 14	62 (62)	40 (64.51)	22 (35.49)	0.009
15-30	25 (25)	10 (40)	15 (60)	
>30	13 (13)	4 (30.76)	9 (69.24)	

Time to initiate treatment was ≤ 14 days (62%) in majority of patients followed by 15-30 days (25%) and >30 days (13%). Recovery was noted in early initiation of treatment and difference was statistically significant ($p<0.05$).

Discussion

Sudden sensorineural hearing loss (SSNHL) is an otologic emergency defined as sensorineural hearing loss 30 dB that affects at least 3 consecutive frequencies and occurs within a 72-hour window. The incidence of SSNHL is estimated at 5 to 27 per 100,000 people annually. [15] The physiopathologic mechanisms involved with SSNHL are still under debate, as several theories have been proposed: circulatory disturbances, viral infections, autoimmune disorders,

disruptions of inner ear membranes, cerebellopontine angle tumors, or a combination of processes. [16]

The etiology of ISSNHL remains unknown. Its pathogenesis is most often suggested to be due to a disturbed microcirculation and infection. Purushothaman G et al., [17]]studied 122 patients, 58% had complete recovery and 28% had partial recovery. The average pre-treatment PTA was 78.3±16.9 dB whereas post-treatment average was 47.0±20.8 dB, showing statistically significant improvement (t=24.89, P≤0.001). The factors such as presence of tinnitus (P=0.005) and initial milder hearing loss (P=0.005) were found to be significant predictors for hearing recovery. Conventional steroid regimes produced a recovery rate in ISSNHL, which exceeds the spontaneous recovery rate. Adriana P et al., [18] studied idiopathic sudden sensorineural hearing loss (ISSNHL) among 186 patients, majority patients were between 41 and 60 years of age. Univariate analysis revealed that vertigo; presence of severe or profound initial hearing loss; flat, U-shaped, and descending audiogram curves; and initiating treatment after 15 days were correlated with worse hearing recovery. However, the multivariate logistic model revealed that only the presence of severe or profound hearing loss (odds ratio, 6.634; 95% CI, 2.714-16.216; P=.001) and initiating treatment after 15 days (odds ratio, 0.250; 95% CI, 0.102- 0.610; P= .008) were independent risk factors for worse hearing recovery prognosis.

In an updated Cochrane systematic review based on 3 randomized controlled trials, as well as another recent review, both concluded that the importance of steroids in the treatment of ISSNHL remains unclear. [19,20] Even though, inconsistent results regarding the treatment success have been reported, steroid treatment is one of the treatment options that has shown efficacy In study by Lee HS et al. [21] starting treatment after 14 days of hearing loss onset was an independent factor for worse hearing recovery. Many preceding reports described a delayed start to treatment as a negative prognostic factor. [22] This finding may be explained by the possible modification of the inflammatory cell death cascade in SSNHL with the use of corticosteroids, as well as the suggestion that corticosteroids offer the most remarkable recovery in the first 2 weeks. The theory of blood circulation disturbance might be the etiology of some cases of ISSHL. A transient reduction in blood pressure values, commonly occurs in young subjects without vascular risk factors, which may cause cochlear ischemia and reversible hearing impairment, and restoration .[22] A prolonged period of unilateral hearing or pseudo hearing can lead to hearing deterioration in the better ear. To avoid the same, cochlear implantation has to be considered over other management options in asymmetrical or unilateral hearing loss cases. [23]

Conclusion

In patients with sudden onset sensorineural hearing loss age less than 40 years, no comorbidities, lesser degree of hearing loss, early (<14 days) initiation of treatment are factors associated with recovery.

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