

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

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Conflict of interest: Nil

Abstract

Aim: To study clinical profile of patients with sudden onset sensorineural hearing loss at a tertiary hospital.

Material & Methods: Present study was single-center, retrospective study, conducted in Department of ENT, MP Birla Hospital & Priyamwada Birla Cancer Research Institute, Satna (MP), India. Study approval was taken from institutional ethical committee. Case records of patients with sudden onset sensorineural hearing loss examined over a period of 10 months were considered for present study.

Results: Vertigo was significant in patients without recovery (63.33%) as compared to patients with recovery (20 %) and difference was statistically significant ($p < 0.05$). Recovery was noted in early initiation of treatment 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

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Introduction

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. [1] The incidence of SSNHL is estimated at 5 to 27 per 100,000 people annually. [2] 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. [3-4]

SNHL 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 SNHL have been published, their methodological heterogeneity and small sample sizes undermine proper analysis and comparison of their results. [5]

Idiopathic sudden sensorineural hearing loss is a heterogeneous disease in terms of clinical symptoms (with/without vertigo, tinnitus, and fullness), causes (viral

infection, immunologic causes, and vascular), the severity of hearing loss (mild, moderate, severe, and profound), and prognosis. Profound ISSNHL has a particularly poor prognosis, regardless of the treatment type and hospital stay. Although numerous studies concerning severe to profound ISSNHL have been published, most did not completely separate total and subtotal hearing loss based on the initial pure-tone audiometry. [6]

Audio logical evaluation provides a criterion for the diagnosis of ISSNHL; in the case of retro-cochlear lesions, further investigations like imaging studies are necessary to rule out other causes like vestibular Schwannoma, cerebro-vascular accidents and the like. Present study was aimed to study clinical profile of patients with sudden onset sensorineural hearing loss at a tertiary hospital.

Material & Methods:

Present study was single-center, retrospective study, conducted in Department of ENT, MP Birla Hospital & Priyamwada Birla Cancer Research Institute, Satna (MP), India. Study approval was taken from institutional ethical committee. Case records of patients with sudden onset sensorineural hearing loss examined over a period of 4 months were considered for present study.

Methodology

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 $\geq 50\%$ 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 were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

Results:

We studied total 100 case records. All patients were compared according to recovery status. Recovery was noticed in 40 patients while no or less than 50 % recovery was noticed in 60 patients. In patients with recovery, mean age was 40.22 ± 9.04 years as compared to patients without recovery as 50.68 ± 10.30 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 (49), diabetes (24), dyslipidemia (20) and thyroid disorder (6) 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 1: General characteristics

Characteristics	Total (n=100)	With recovery (n=40)		Without recovery (n=60)		P value
	No. of patients	No. of patients,	(%)	No. of patients,	(%)	
Age (years)						
≤ 20	4	2	5	2	1.667	
21-40	32	10	25	11	21.67	
41-60	45	21	52.5	25	31.67	
>60	19	7	17.5	22	16.67	
Mean Age (years)	40.22 ± 9.04	41.40 ± 9.42		50.68 ± 10.30		<0.05
Gender						
Male	41	21	52.5	24	40	>0.05
Female	59	19	47.5	36	60	
Comorbidity						
Hypertension	49	9	28.00%	18	30	>0.05
Diabetes	24	6	38.46%	8	13.33	>0.05
Dyslipidemia	20	3	26.67%	11	18.33	>0.05
Thyroid disorder	6	1	33.33%	4	6.667	>0.05
Autoimmune disease	1	0	0	0	0	0

Vertigo was significant in patients without recovery (63.33%) as compared to patients with recovery (20 %) and difference was statistically significant ($p<0.05$). Tinnitus was comparable in patients with recovery (53.33%) as well as patients without recovery (22.5%) and difference was statistically not significant ($p>0.05$).

Table 2: Clinical features

Clinical features	Total (n=100)	With recovery (n=40)		Without recovery (n=60)		P value
	No. of patients	No. of patients,	(%)	No. of patients,	(%)	
Vertigo	51	8	20	38	63.33	<0.05
Tinnitus	84	9	22.5	32	53.33	>0.05

Audiogram curve was flat, U-shaped, reverse U-shaped (49 %) in majority of patients followed by descending (33 %) and ascending (18 %).

Table 3: Audiogram curve

Audiogram curve	Total (n=100)	With recovery (n=40)		Without recovery (n=60)		P value
	No. of patients	No. of patients	(%)	No. of patients	(%)	
Ascending	18	5	12.5	8	13.33	0.018
Descending	33	10	25	22	36.67	
Flat, U-shaped, reverse U-shaped	49	15	37.5	31	51.67	

Degree of hearing loss was mild (9 %), moderate (14 %), moderately severe (19 %), severe (21 %) and profound (37 %). Incidence of patients without recovery was increased with increase in severity of hearing loss and difference was statistically significant ($p < 0.01$).

Table 4: Degree of hearing loss

Degree Of hearing loss	Total (n=100)	With recovery (n=40)		Without recovery (n=60)		P value
	No. of patients	No. of patients	(%)	No. of patients	(%)	
Mild	9	1	2.5	2	3.333	0.010
Moderate	14	6	15	3	5	
Moderately severe	19	10	25	9	15	
Severe	21	15	37.5	10	16.67	
Profound	37	8	20	36	60	

Time to initiate treatment was ≤ 14 days (63 %) in majority of patients followed by 15-30 days (27 %) and >30 days (10 %). Recovery was noted in early initiation of treatment and difference was statistically significant ($p < 0.05$).

Table 5: Time to initiate treatment

Time to initiate treatment (days)	Total (n=100)	With recovery (n=40)		Without recovery (n=60)		P value
	No. of patients	No. of patients	(%)	No. of patients	(%)	
≤ 14	63	26	65	31	51.67	0.05
15-30	27	11	27.5	21	35	
>30	10	3	7.5	8	13.33	

Discussion:

The recovery rate of ISSNHL in pediatric patients is higher than in adults [7] and two more were excluded due to psychogenic deafness (ABR and DPOAE). Clinically, vestibular Schwannoma patients present with unilateral sensorineural hearing loss (94%) and tinnitus (83%) [8]. An inner ear MRI can detect vestibular Schwannoma, large vestibular aqueduct, hemorrhage, and inner ear malformations.

Min et al. [9] reported labyrinthine signal abnormalities in post contrast heavily T2-weighted three-dimensional fluid attenuated inversion recovery imaging (HF sequence) in 37.7% of patients with ISSNHL and severe-to-profound hearing loss. Increased signal intensity ratio indicates more severe hearing loss and poor prognosis [9], and Wei et al. [10]

reported that a higher percentage of patients with profound SSNHL induced by inner ear hemorrhage experienced vertigo and had a poor prognosis.

Mattox and Simmons [11] reported that recovery was better at low frequencies corresponding to the apex of the cochlea than at the base. The authors hypothesized that the basal region of the cochlea may be more susceptible to permanent damage than upper regions, possibly due to differences in blood supply and metabolic needs. Likewise, Psillas et al [12] and Imamura et al [13] demonstrated that patients who had SSNHL that exclusively affected low frequencies had a significantly better prognosis than patients who had losses at high frequencies.

Purushothaman G et al. [14] 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 ($t=24.89$, $P \leq 0.001$). 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. [15] studied idiopathic sudden sensorineural hearing loss (ISSNHL) among 186 patients, majority patients were between 41 and 60 years of age.

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.[16] 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. [17]

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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