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Study of clinical profile of patients with sudden onset sensorineural hearing loss at a tertiary hospital

Shripad Harihar Patil[1], Sham V Rane[2]

[1]M.S. Department of ENT (OTOLARYNGOLOGY), Additional Civil Surgeon, District civil Hospital, Sindhudurg 416520, Maharashtra, India.
[2]MBBS, DLO, Civil Hospital, Sindhudurg 416520, MMC registration no. 75342, India.

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Abstract

Background: 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. Present study was aimed to study clinical profile of patients with sudden onset sensorineural hearing loss at a tertiary hospital. **Material and Methods:** Present study was single-center, retrospective study, conducted in case records of patients with sudden onset sensorineural hearing loss. **Results:** We studied total 74 case records. All patients were compared according to recovery status.Recovery was noticed in 31 patients (41.89 %) while no or less than 50 % recovery was noticed in 43 patients (58.11 %). Majority of patients were from 41-60 years age group (43.24 %) & 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 (33.78 %), diabetes (17.57 %), dyslipidemia (20.27 %) & thyroid disorder (8.11 %) were common comorbidities noted among patients. Vertigo was significant in patients without recovery (68.75 %) as compared to patients with recovery (31.25 %) & difference was statistically significant ($p<0.05$). Degree Of hearing loss was mild (8.11 %), moderate (10.81 %), moderately severe (20.27 %), severe (25.68 %) & profound (35.14 %). Incidence of patients without recovery was increased with increase in severity of hearing loss & difference was statistically significant ($p<0.05$). Time to initiate treatment was ≤ 14 days (62.16 %) in majority of patients followed by 15-30 days (25.68 %) & >30 days (12.16 %). Recovery was noted in early initiation of treatment & 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

Corresponding Author: Dr. Shripad Harihar Patil, M.S. Department of ENT (OTOLARYNGOLOGY), Additional Civil Surgeon, District civil Hospital, Sindhudurg 416520, Maharashtra, India.
Email: visupatil@gmail.com

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

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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] 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.[5,6]

Audiological 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 and Methods

Present study was single-center, retrospective study, conducted in department of otorhinolaryngology, at XXX medical college & hospital, XXX, India. Study approval was taken from institutional ethical committee.

Case records of patients with sudden onset sensorineural hearing loss examined between January 2016 to December 2020 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 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 74 case records. All patients were compared according to recovery status.Recovery was noticed in 31 patients (41.89 %) while no or less than 50 % recovery was noticed in 43 patients (58.11 %).

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Majority of patients were from 41-60 years age group (43.24 %) followed by from 21-40 years age group (29.73 %). 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 (33.78 %), diabetes (17.57 %), dyslipidemia (20.27 %) & thyroid disorder (8.11 %) 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=74)**		**With recovery (n=31)**		**Without recovery (n=43)**		**P value**
	No. of patients,	**(%)**	**No. of patients,**	**(%)**	**No. of patients,**	**(%)**	
Age (years)							
≤ 20	4	5.41%	3	75.00%	1	25.00%	
21-40	22	29.73%	9	40.91%	13	59.09%	
41-60	32	43.24%	13	40.63%	19	59.38%	
>60	16	21.62%	6	37.50%	10	62.50%	
Mean Age (years)	47.66 ± 13.54		41.87 ± 9.34		50.51 ± 10.78		<0.05
Gender							
Male	36	48.65%	16	44.44%	20	55.56%	>0.05
Female	38	51.35%	15	39.47%	23	60.53%	
Comorbidity							
Hypertension	25	33.78%	7	28.00%	18	72.00%	>0.05
Diabetes	13	17.57%	5	38.46%	8	61.54%	>0.05
Dyslipidemia	15	20.27%	4	26.67%	11	73.33%	>0.05
Thyroid disorder	6	8.11%	2	33.33%	4	66.67%	>0.05
Autoimmune disease	1	1.35%	0	0.00%	1	100.00%	0

Vertigo was significant in patients without recovery (68.75 %) as compared to patients with recovery (31.25 %) & difference was statistically significant ($p<0.05$). Tinnitus was comparable in patients with recovery (41.94 %) as well as patients without recovery (58.06 %) & difference was statistically not significant ($p>0.05$).

Table 2: Clinical features

Clinical features	**Total (n=74)**		**With recovery (n=31)**		**Without recovery (n=43)**		**P value**
	No. of patients,	**(%)**	**No. of patients,**	**(%)**	**No. of patients,**	**(%)**	
Vertigo	32	43.24%	10	31.25%	22	68.75%	<0.05
Tinnitus	62	83.78%	26	41.94%	36	58.06%	>0.05

Audiogram curve was flat, U-shaped, reverse U-shaped (47.30 %) in majority of patients followed by descending (36.49 %) & ascending (16.22 %).

Table 3: Audiogram curve

Audiogram curve	**Total (n=74)**	**With recovery (n=31)**	**Without recovery (n=43)**	**P value**

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	No. of patients,	(%)	No. of patients,	(%)	No. of patients,	(%)	
Ascending	12	16.22%	6	50.00%	6	50.00%	0.015
Descending	27	36.49%	8	29.63%	19	70.37%	
Flat, U-shaped, reverse U-shaped	35	47.30%	14	40.00%	21	60.00%	

Degree Of hearing loss was mild (8.11 %), moderate (10.81 %), moderately severe (20.27 %), severe (25.68 %) & profound (35.14 %). Incidence of patients without recovery was increased with increase in severity of hearing loss & difference was statistically significant ($p<0.05$).

Table 4: Degree Of hearing loss

Degree Of hearing loss	Total (n=74)		With recovery (n=31)		Without recovery (n=43)		P value
	No. of patients,	(%)	No. of patients,	(%)	No. of patients,	(%)	
Mild	6	8.11%	2	33.33%	4	66.67%	0.012
Moderate	8	10.81%	3	37.50%	5	62.50%	
Moderately severe	15	20.27%	8	53.33%	7	46.67%	
Severe	19	25.68%	12	63.16%	7	36.84%	
Profound	26	35.14%	6	23.08%	20	76.92%	

Time to initiate treatment was ≤ 14 days (62.16 %) in majority of patients followed by 15-30 days (25.68 %) & >30 days (12.16 %). Recovery was noted in early initiation of treatment & difference was statistically significant ($p<0.05$).

Table 5: Time to initiate treatment

Time to initiate treatment (days)	Total (n=74)		With recovery (n=31)		Without recovery (n=43)		P value
	No. of patients,	(%)	No. of patients,	(%)	No. of patients,	(%)	
≤ 14	46	62.16%	24	52.17%	22	47.83%	0.009
15-30	19	25.68%	5	26.32%	14	73.68%	
>30	9	12.16%	2	22.22%	7	77.78%	

Discussion

Idiopathic sudden sensorineural hearing loss (ISSNHL) is an emergency disease requiring immediate diagnosis and treatment. 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.,[7] 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 ($t=24.89$, $P\leq0.001$). 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.,[8] studied idiopathic sudden sensorineural hearing loss (ISSNHL) among 186 patients, majority patients were between 41 and 60 years of age. Univariate

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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.

Wen Xie et al.,[9] noted annual incidence of ISSNHL in China mainland as 19 per 100 000. Also patients with vertigo, hypertension, DM and high TG suffered more often from severe hearing loss compared with the counterparts. This indicates that the cardiovascular and metabolic diseases (hypertension and hyperlipidemia) appeared to be closely associated with the occurrence and severity of ISSNHL.

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.[10,11] 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.,[12] 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.9,13,23 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.[13] 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.

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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