

To Identify the Factors Which Can Predict the Prognosis of Sudden Sensorineural Hearing Loss (SSNHL)

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ABSTRACT

Introduction: This is a retrospective study to evaluate the prognostic indicators in management of sudden sensorineural hearing loss (SSNHL) in otorhinolaryngology patients admitted in a tertiary care hospital.

Methods: The study covered the data collected from 45 patients of SSNHL, who were treated with oral prednisolone. Their hearing improvement (more than 20 dB) in relation to hearing loss severity, vertigo, age of the patients and duration from symptom onset to time of treatment initiation, was evaluated.

Results: Out of 45 patients with idiopathic SSNHL, 73% of patients improved with oral prednisolone treatment. Vertigo and tinnitus at the time of onset of disease are symptoms of poor prognosis. In the present study, only 59% patients with vertigo and 32% with tinnitus improved. Patients aged between 31 and 60 years appeared to have better prognosis of hearing improvement compared to those outside of this age range. 89 percent patients whose treatment started within the first week of onset of hearing loss experienced hearing improvement compared to 47 percent patients whose treatment was started after first week.

Conclusion: SSNHL is a disease of unknown etiology in which corticosteroids have significant role. The vertigo, tinnitus and advance age are poor prognostic signs. To gain the maximum improvement in SSNHL, treatment should be started as early as possible.

KEYWORDS: Hearing Loss, Vertigo, Prednisolone, Tinnitus.

INTRODUCTION

One of the few emergencies in otology, the SSNHL affects mostly those in their fourth decade of life, involving both the right and the left ears in equal proportions, and the same trend is seen genderwise.¹ It affects 5 to 20 persons per 1 lac individuals. It is estimated that, approximately fifteen thousand new cases per year are detected, all over the world.²

In India, epidemiological references as to the true incidence of SSNHL are lacking, due to the difficulty in assessing its incidence. Poor cultural and socioeconomical conditions, possibility of spontaneous recovery before seeking medical help or the very disregard towards symptoms are responsible for this epidemiological picture.³

DeKlein^{1,2} in 1944, was the first to report a clinical study of 21 patients with SSNHL. The causes of hearing loss mentioned were inner ear hemorrhage, acute and chronic inflammations, traumatic fractures, multiple sclerosis, brain tumors, ototoxic drugs, emboli, hypercoagulability, radiation, pregnancy and herpes zoster. Later, Rasmussen, Fowler and Hallberg, reported the cases of SSNHL and discussed the disease origin, proposing vascular origin and neuritis of the VIII nerve as possible causes.

Following that, Lindsay & Zuidema (1950) also studied patients with SSNHL and considered the possibility of vasospasms, besides infection as the possible cause for hearing loss (HL), which justifies the variable pattern of auditory and vestibular involvement. Back in 1950, Fowler reported not only the importance of supratentorial disorder, but also change in the blood viscosity, as possible causes for SSNHL. Opheim, Apud Hallberg (1956), highlighted the possibility of an acute increase in labyrinth pressure as being responsible for SSNHL.

Moulouguet and Bouche (1952), reported the case of a young physician with SSNHL after having used an intravenous medication, and also considered that the arteriolar spasm caused by this drug caused clinical signs and symptoms in him.^{3,4}

In etiology of SSNHL, autoimmune causes were also included as a possibility. In 1979, McCabe was the first to associate SSNHL with autoimmune diseases. Not always identified, diseases such as rheumatoid arthritis, lupus, polyarthritis nodosa and others are possible mediators of the antibody and immuno-complex processes that may be involved in the origin of sudden hearing loss.⁵⁻⁷

The present study was aimed to identify the factors which can predict the prognosis of SSNHL.

MATERIALS AND METHODS

Forty nine patients (49 ears) who developed hearing losses of at least 30 dB in three contiguous frequencies developed during a period of less than 3 days were evaluated in Department of Otorhinolaryngology, Gian Sagar Medical College and Hospital, Patiala, Punjab, India.

All patients were seen within 15 days of onset of the hearing loss and none had received prior treatment. 2 patients lost to follow up and 2 patients were excluded from the study due to herpes zoster oticus and acoustic neuroma.

During the period of treatment, the audiograms were done every two to three days and those who failed to improve were further investigated by computed tomography or magnetic resonance imaging for organic causes, such as acoustic neuroma. The audiograms were done on the thresholds of hearing on increments of 5dB

and the frequencies in KHz 0.25, 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 6.0 and 8.0.

The patients were further categorized depending upon their hearing losses as mild (26-40 dB), moderate (41-70 dB), severe (71-90 dB), profound (>90 dB), or total.

Initial laboratory tests included complete blood count, determination of fasting glucose, total and fractionated cholesterol and triglycerides, and erythrocyte sedimentation rate.

All examinations were performed before or on the first day of treatment.

All subjects received prednisolone after the first evaluation. The initial dosage of prednisone was 1 mg/kg (60 mg/day maximum) by mouth daily for 5 days, then tapered-off and discontinued after 15 days.

All patients were treated as outpatients. The hearing improvement was considered as improvement in hearing from initial thresholds by more than 20 dB at least in two contiguous frequencies. Other associated conditions like diabetes, hypertension, dyslipidemia and any other comorbidities were noted and analyzed. No surgical intervention was performed during the 6-month period of follow-up.

OBSERVATIONS

The ratio of male to female patients was 21 to 24, and ratio of right to left ears was 26 to 19. There was one patient with bilateral hearing loss and did not experience any hearing improvement.

The duration from symptom onset to inpatient treatment ranged from one day to 15 days, and the main presenting symptoms were deafness (42 patients), tinnitus (38), and vertigo (12), with some patients having more than one presenting symptom

There were 17 patients having vertigo. The percentages of patients having hearing improvement were found to be 89% for those with no vertigo and 59% for those with vertigo. It appeared that patients without vertigo have a higher chance of hearing improvement. Similarly, patients having tinnitus at the time of onset of disease had poor prognosis in hearing as only 32 % of them improved.

The duration of onset of hearing loss to the time of treatment varied from one day to 15 days. In this study, patients were divided in two groups based on the duration of treatment initiation after onset of symptoms i.e., less than seven days and more than seven days.

It was observed that the best prognosis in form of hearing improvement of more than 20 dB was in patients treated within first week from the onset of hearing loss (Table 1).

In the present study, six patients were found to have diabetes mellitus, two with hypertension, and two with hyperlipidaemia. 50% of diabetes mellitus and 100% with hypertension improved with steroid therapy.

Table 1: Observations of Present study

	Age in years	Total no of patients	No of improved patients
Age distribution	31 -40	3	3(100%)
	41- 50	6	6(100%)
	51-60	15	12 (80%)
	61-70	17	13 (76%)
	71-80	4	1 (25%)
Associated illness	Groups	Total no of patients	No of improved patients
	No systemic illness	33	28 (84%)
	Associated	12	5 (16%)
Duration from onset to treatment		Total no of patients	No of improved patients
	Group 1 (Less than 7 days)	28	25 (89%)
	Group 2 (More than 7 days)	17	8 (47%)
Degree of hearing loss		Total no of patients	No of improved patients
	More than 80 db	25	15 (60%)
	Less than 80 db	20	18 (90%)
Associtated symptoms	Groups	Total no of patients	No of improved patients
	Vertigo	17	10 (59%)
	Tinnitus	25	8 (32%)
	Pain in the ear	12	7 (67%)
Associated illness	Groups	Total no of patients	No of improved patients
	Diabetes,	6	3 (50%)
	Hypertension	2	2 (100%)
	Dyslipidemia	2	0 (0%)
	CRF	1	0 (0%)
	Leukemia	1	0 (0%)

OBSERVATIONS

The ratio of male to female patients was 21 to 24, and ratio of right to left ears was 26 to 19. There was one patient with bilateral hearing loss and did not experience any hearing improvement. The duration from symptom onset to inpatient treatment ranged from one day to 15 days, and the main presenting symptoms were deafness (42 patients), tinnitus (38), and vertigo (12), with some patients having more than one presenting symptom.

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The duration of onset of hearing loss to the time of treatment varied from one day to 15 days. In this study, patients were divided in two groups based on the duration of treatment initiation after onset of symptoms i.e., less than seven days and more than seven days. It was observed that the best prognosis in form of hearing improvement of more than 20 dB was in patients treated within first week from the onset of hearing loss (Table 1). In the present study, six patients were found to have diabetes mellitus, two with hypertension, and two with hyperlipidaemia. 50% of diabetes mellitus and 100% with hypertension improved with steroid therapy.

DISCUSSION

Prognostic indicators or factors have been published in the past decades in many countries. However, not much data is available from Indian population. More so, there is no consensus on the exact patho-physiogenic mechanisms facilitating the onset of SSNHL. The theories most commonly advanced are vascular, autoimmune, and viral.⁸⁻¹¹ This concept has, in addition, generated many therapeutic regimes including different drugs such as diuretics, vasodilators, volume expanders, corticosteroids, and immunomodulators. While the idiopathic nature of this condition inherently presents a therapeutic dilemma, it nonetheless is important to identify the treatment that is most beneficial to the patient.

In a non-randomized and non-controlled study by Mattox⁸ et al, there was 65% hearing improvement without any treatment, despite this, systemic administration of high doses of corticosteroid is a widely used treatment with proven effectiveness in patients suffering from SSNHL as is evident from Wilson⁹ et al, controlled clinical study revealing significant hearing improvement in 61% of patients receiving oral steroids and only 32% in those in the control group ($P < .05$). Steroids have been used widely in the treatment of SSNHL because of their proposed benefit in infectious, inflammatory, and other immune-mediated conditions and despite the fact that their specific mechanism of action is unknown.¹⁴

There have been many routes of administering corticosteroids for SSNHL described in medical literature. Though there are many studies^{12,13} highlighting the merits of intratympanic injection, which advocates its importance due to lack of systemic affects of corticoids. However, the invasive nature of intratympanic steroid therapy requires compliance of the patient. In the present study, not much adverse effects were noticed despite the use of high dose oral corticosteroids. One of the points of convergence in the study of this disease is the fact that vertigo and profound initial hearing loss are valuable indicators of poor prognosis for hearing recovery in these patients, a fact that was amply demonstrated by Byl¹, Amin¹⁶, and

Nakashima and Yanagita.¹⁷ The initial symptom of vertigo has been found to be a bad prognostic indicator in various studies and the extensive damage of cochlea involving the vestibular apparatus had been suggested. In a study by Mario¹⁵, severity of initial hypoacusis and presence of vertigo had no significant influence on the recovery of hearing in patients. But our study showed that vertigo and degree of hypoacusis at the onset of disease made a lot of difference in prognosis of the patient as was seen in the other studies.

A Malaysian report by Amin¹⁶ who reviewed 32 patients, found the good prognostic indicators when treatment was started within five days of onset of hearing loss and bad prognostic indicators in bilateral hearing loss. In the present study also, the improvement was better if treatment started within seven days of onset of symptoms, whereas a single patient with bilateral disease didn't show any improvement. Most of the patients who had associated conditions of diabetes mellitus, hypertension and hyperlipidaemia had poor hearing improvement of less than 42%. This suggests that the associated conditions could be contributory factors to poor prognosis, and management of SSNHL should include special consideration for comorbidities.

CONCLUSION

SSNHL is a disease of unknown etiology in which corticosteroids is the mainstay of treatment. The vertigo, tinnitus and advance age are poor prognostic signs. Bilateral disease and degree of hypoacusis are other bad prognostic indicators of disease. So it is concluded that to gain the maximum improvement in SSNHL, treatment should be started as early as possible.

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