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Original Research Article

A study of clinical and audiometric profile in patients presenting with sudden sensorineural hearing loss

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ABSTRACT

Background: To assess the clinical and audiometric profile in patients presenting with sudden sensorineural hearing loss (SSNHL).The study also aimed to find out any possible etiology of SSNHL, prognostic factors and effectiveness of treatment. Prospective, open label, randomized study conducted in department of ENT at the Ram Lal eye and ENT hospital attached to Government medical college, Amritsar, Punjab, India.
Methods: 50 patients of either sex aged between 18 to 50 years suffering from unilateral or bilateral onset SSNHL included in the study on the basis of predetermined clinical criteria. The hearing assessments of patients were done before and after the treatment with tuning fork tests, pure-tone and impedance audiometry.
Results: Most of the patients of SSNHL presented with unknown etiology. Steroid treatment gave a statistically significant improvement in pure tone averages. Maximum improvement is observed in patients who started treatment within one month of developing SSNHL. Post-treatment outcomes were not influenced by age of the patient and type of the pure tone audiometry graph. The presence of vertigo and diabetes are bad prognostic factors for hearing outcome in SSNHL.
Conclusions: Most of the cases of sudden sensorineural hearing loss have unknown etiology. Patients with associated DM and vertigo are having poor recovery of hearing. Early starting of treatment gives maximum improvement of hearing.

Keywords: Sudden sensorineural hearing loss, Clinical and audiometric profile

INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is first ascribed to Dekleyn in 1944.[1] It commonly presents as acute hearing loss occurring within 72 hours and is an emergency condition requiring immediate medical attention. Sudden sensorineural hearing loss (SSNHL) is defined as a hearing loss of 30 dB or more in one ear or both over at least three contiguous frequencies in audiometry, over a period of 72 hours or less. Hearing loss can range from mild hearing impairment to a total loss of hearing, and may be temporary or permanent.[2]

Estimated incidence of SSNHL typically range from 2 to 20 per 100,000 people per year.[3,4] SSNHL can occur at any age, but most commonly affects patients 43 to 53 years of age and is equally distributed among males and females. Early presentation to a physician and early institution of treatment improves the prognosis for hearing recovery. The immediate goal is discovering a treatable or defined cause of the sudden hearing loss.[5]

There are a number of causes of sensorineural hearing loss such as idiopathic, infective (viral, bacterial), noise induced, trauma (temporal bone fracture), ototoxic drugs,

autoimmune (SLE, cogan syndrome, ulcerative colitis), tumors (vestibular schwannoma, leukemia, myeloma), vascular (cerebrovascular diseases, sickle cell disease), perilymphatic fistula, barotraumas, neurological (multiple sclerosis, cerebrovascular accident, migraine), others (diabetes mellitus, sarcoidosis), non-organic hearing loss.[6] Though there is no gold standard test for SSNHL, the diagnosis depends on the following investigations: tuning fork tests, pure-tone audiometry (PTA) and impedance audiometry. Short increment sensitivity index (SISI), speech reception threshold (SRT), speech discrimination score (SDS) also form an important part of the audiometry.

Most of the clinicians recommend corticosteroids for the treatment of SSNHL. The most prescribed drug is oral prednisone.[7] Steroids are known to act in the inner ear and have been effectively used in viral, syphilitic, autoimmune, endolymphatic (Meniere's disease) and other causes of hearing loss.[8,9] Other pharmacological agents like antivirals, thrombolytics, vasoactive substances, vasodilators, hyperbaric oxygen therapy, carbogen inhalation therapy also have been tried.

METHODS

The study conducted in 50 patients presented to department of ENT at the Ram Lal eye and ENT hospital attached to government medical college, Amritsar during July 2014 to Dec 2016. An informed consent of patients was taken and approval from institutional ethical committee obtained.

A complete detailed history with particular attention to mode of onset, duration, pattern and progression of the hearing loss, associated symptoms, presence of systemic diseases like diabetes, hypertension, tuberculosis, previous treatment taken by the patient were taken. The patients were subjected to complete examination of ear, nose, throat and a fairly comprehensive oto-endoscopic examination also. The hearing assessments of patients were done with tuning fork tests, pure-tone and impedance audiometry. The patient's ability to hear and understand speech is measured by parameters like speech reception threshold (SRT) and speech discrimination score. Short increment sensitivity index test (SISI) was used to distinguish cochlear lesion from retro-cochlear lesion. Tone decay test also used to detect retro-cochlear lesion.

After the diagnosis has been made, patients are randomly selected either for oral steroid treatment or intratympanic steroid injection. Follow-up of the patients were done on 30th and 90th day from the day of starting treatment. PTA also repeated on 90th day to assess the change in PTA from day one.

The results of the study were tabulated and analysed using parametric test like paired t test, student t test and non-parametric tests like chi square test. The level of significance was determined and p value of < 0.05 was taken as statistically significant and p value > 0.05 interpreted as the difference is not significant.

Inclusion criteria

Patients of either gender in the age group of 18-50 years, patients diagnosed as SSNHL and present within 90 days of onset SSNHL.

Exclusion criteria

Patients who present later than 90 days of onset of symptoms, patients with prior history of ear disease, patients with congenital hearing loss, patients with history of long standing exposure to loud noise, patients having age <18 year or >50 year, patients with prior history of radiotherapy to head and neck or chemotherapy.

RESULTS

Fifty patients and a total of 68 ears with sudden sensorineural hearing loss were recruited in this study. Unilateral left ear involvement seen in 36% of patients (18 out of 50) and right ear involvement in 28% (14 out of 50 patients). In rest 36% (18 out of 50) patients had bilateral ear involvement.

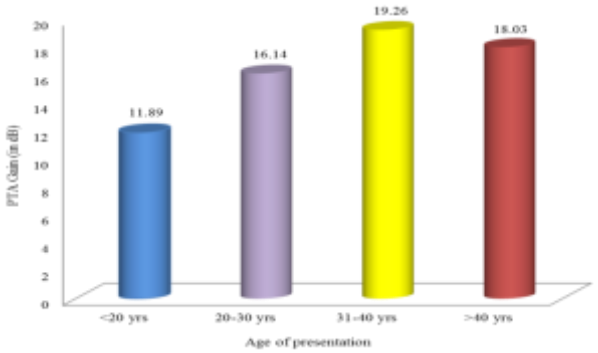

Figure 1: Age of presentation and gain in pta after the treatment.

There were 6 patients in <20 year age group, 10 in 20-30 year, 12 in 31-40 year and 22 patients in >40 year group respectively. In our study we observed that age of the patient did not affect the outcome of the disease statistically ($p>0.05$) as shown in Figure 1.

Table 1: Day of starting treatment and PTA gain.

Day of starting treatment	No. of ears (n=68)	Pta gain (mean±sd; in db)
<1 month	36	27.88 ± 15.35
1 to 2 months	18	6.07 ± 8.16
>2 months	14	5.14 ± 6.46

Maximum improvement in PTA obtained in patients who started treatment within one month of developing SSNHL and the gain in PTA after treatment (27.88 dB) was statistically significant (p<0.05).

4 out of 50 patients had history of associated vertigo. Improvement on pure tone audiometry was lesser (0 db) in patients who had a history of vertigo at the time of presentation in comparison with hearing gain in patients without vertigo (average gain of 19.11 db). The p value was statistically significant (p<0.05).

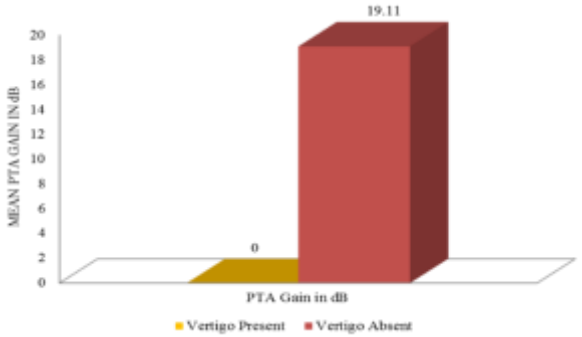

Figure 2: Vertigo & change in PTA after the treatment.

There were 4 diabetic patients in our study. A statistically significant change from baseline PTA was observed when we compared subgroup presented with diabetes (average gain of 18.53 db) with those who had no history of diabetes(6 db gain) at the time of enrolment in study. P value <0.05.

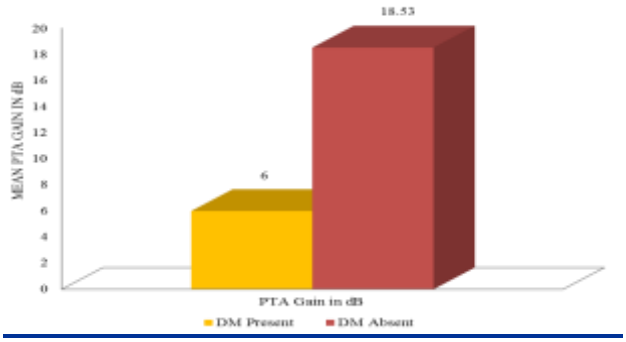

Figure 3: Diabetes mellitus and change in PTA after the treatment.

Table 2: Type of graph and PTA gain after the treatment.

Type of graph	No. of ears (N=68)	PTA gain (mean ±SD; in db)
Downward sloping	38(56%)	16.65 ± 16.71
Trough shaped	22(32%)	16.74 ± 13.99
Upward sloping	8(12%)	23.00 ± 22.53

Most common pattern observed on audiometry was downward sloping graph in 56% (38 out of 68) ears; followed by trough shaped graph in 32% (22 out of 68) and upward sloping in 12% (8 out of 68) ears. Maximum improvement of 23 db was seen in patients with upward sloping type of audiogram. But it was not statistically significant on anova test (p>0.05).

DISCUSSION

Maximum hearing improvement in our study observed in age group of 31-40 years. But statistical comparison with other age groups, anova showed that the age of the patient did not affect the outcome of the disease (p >0.05). Increasing age was found to be associated with poorer prognosis in most of the studies.[2,10,11] However, in a retrospective study which was conducted to find out the factors that affect hearing outcome, the result indicated that age of the patient had no effect on the outcome of hearing.[12]

A natural-history study has shown that spontaneous recovery occurs almost exclusively within the first two weeks after the onset of sudden sensorineural hearing loss. Four studies assessing the relationship between the duration of sudden sensorineural hearing loss before treatment and outcomes have reported the greatest recovery of hearing when corticosteroids are initiated within the first 1 to 2 weeks after symptom onset, and little if any benefit when initiated 4 weeks or longer after the onset of symptoms.[3,13,14,15] The sooner a response is seen, the better the overall prognosis appears to be. Patients who show no improvement at the completion of treatment with corticosteroids have a poor prognosis. Our study results also are consistent with these studies.

In number of studies complaints of imbalance or vertigo have been associated with a poorer prognosis for hearing recovery following SSNHL.[3,11,13] Similarly in a retrospective study, 47 patients were included and evaluated to find out the prognostic factors in idiopathic SSNHL, eight patients were vertigo -positive, and none of them presented a good recovery. The results of present study also support the hypothesis that vertigo is a determining prognostic factor for improvement of hearing in SSNHL

A retrospective review of 67 diabetic patients with SSNHL was conducted at National Taiwan University hospital from 1984 to 2003. The demographic and clinical characteristics, audiometry and course of hearing recovery were reviewed. The mean duration of diabetes was 7.5+7.7 years. Presenting symptoms, the duration of diabetes, the FPG, and the HbA1C had no significant correlations with the severity of hearing loss. With suitable treatment, optimal glycemic control could be achieved even under high-dose steroid regimens. In diabetic patients with SSNHL, hearing loss in the contralateral ear and the profound type hearing loss in the lesion ear were commonly noted. The age and PPG level

had significant correlations to contra-ear hearing loss. The poor prognosis of sudden deafness in diabetes patients may be caused by pre-existing micro vascular lesions in the inner ear, and the PPG level could be a risk factor indicator for cochlear dysfunction in diabetic patients. High-dose glucocorticoid should not be contraindicate in diabetic patients with SSNHL.[16] Results of present study also suggest that the presence of diabetic is a bad prognostic factor for hearing outcome in patients with SSNHL.

Nosarti-Zarenoe et al in a retrospective study found that the hearing improvement was not influenced by the type of audiogram.[17] The results of present study are in disagreement with a number of studies which suggest that type of audiometry graph impacts the outcomes in SSNHL. However it is likely that this may not be the only determining factor and final outcomes are result of interplay of various prognostic factors.

CONCLUSIONS

SSNHL is a medical emergency. Yearly distribution analysis shows an increase in the incidence of this disease in last few years. This condition is mostly idiopathic, only 10-15% of cases can be specified a definite cause. Presence of vertigo and DM found to be adversely affecting in hearing recovery. Age of presentation and type of initial audiogram doesn't have any impact on hearing improvement. Early initiation of treatment gives a good outcome.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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