

A clinical study on idiopathic sudden onset sensorineural hearing loss

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Abstract: Sudden onset sensorineural hearing loss is a medical emergency and exact cause is not known in 90 % of cases. Systemic corticosteroids is used in clinical practice as a primary treatment, although there is doubt regarding its efficacy. Several other forms of treatment have been studied, such as plasma expanders, carbogen, antiviral therapy, hyperbaric oxygen, antioxidants. The objective of study was to evaluate clinical features of idiopathic sudden onset sensorineural hearing loss and its outcome on patients after treatment with oral steroids, antiviral and methylcobalamine injection. A non randomized control trial consisting of 70 cases over a period of 2 years were taken. Efficacy of treatment was based on relief of symptoms, pure tone average pre and post treatment. Hence study proved to be effective treatment option for idiopathic sudden onset sensorineural hearing loss.

Keywords: Sudden onset sensorineural hearing loss, corticosteroids, pure tone average

Date of Submission: 12-03-2018

Date of acceptance: 28-03-2018

I. Introduction

Sudden onset hearing loss is an alarming symptom, and potentially a medical emergency, depending on the cause.¹ Sudden onset sensorineural hearing loss [SSNHL] is defined as loss of hearing of at least 30dB or more at least 3 contiguous frequencies occurring within 3 days.² The exact cause of sudden sensorineural hearing loss is not known and detailed investigation will show a specific cause in about 10% of patients.³ The term Idiopathic sudden sensorineural hearing loss [ISSNHL] is used in the remainder of the cases.

Causes of sudden sensorineural hearing loss are, Infective, Idiopathic, Noise induced, Trauma, Ototoxic drugs, Autoimmune diseases, Tumour, Vascular, Perilymphatic fistula, Barotrauma, Neurological, Diabetes mellitus, Non-organic hearing loss.⁴

Systemic corticosteroids have been used in clinical practice as a primary treatment of ISSNHL; however, there is a lack of consistent data on its effectiveness.² Several other forms of treatment are being used and studied, such as plasma expanders, carbogen, antiviral therapy, hyperbaric oxygen, antioxidants.⁵

Therefore the present study was conducted to analyze clinical aspects, hearing evaluation of idiopathic sudden onset sensorineural hearing loss and to determine the efficacy, and outcome of antiviral, oral steroid (deflazacort) and methylcobalamine injection in its management in the department of Otorhinolaryngology, Regional Institute of Medical Science, Imphal, Manipur.

II. Materials and methods

The study was conducted for a period of 2 years (Oct 2014 – Sept 2016) in Department of Otorhinolaryngology, RIMS, Imphal, Manipur. A total of 70 cases (35 treated patients and 35 control) were studied with sudden onset sensorineural hearing loss of 30 dB or more at least in three contiguous audiometric frequencies occurring within three days or less were included in the study. Patients < 18 years of age with mixed hearing loss, >3 days old sensorineural hearing loss, those having hypertension, diabetes, renal disease, allergy to drugs and contraindicated to steroids and famciclovir were excluded from study. All patients presenting with sudden onset sensorineural hearing loss were non-randomly divided into two groups. One group was treated with oral steroid, antiviral and injection methylcobalamin and other group was not given any medication.

The pretreatment assessment included complete history, head and neck examination, neurological examination including cranial nerves and cerebellar function with special focus on the ear. Patients hearing levels in decibel is assessed with Digital Audiometer AD 2100 at frequencies 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz and 8000 Hz respectively. Pre-treatment pure tone audiometry (PTA) were taken for all study subjects. Study subjects were categorized into 5 groups according to severity of hearing loss. Mild hearing loss is 26-40 dB, moderate is 41-55 dB, moderately severe with 56-70 dB, severe with 71-90 dB loss and more than

90 dB is profound loss.

Patient are treated with oral steroid (Deflazacort 30mg twice daily) for 10 days. Dose is tapered over the next 10 days. Oral famciclovir 500mg two times daily for 21 days. Neurovitamin (inj. Methycobalamin) intramuscular or intravenous for 21 days. Post treatment pure tone average (PTA) were taken weekly during 1st month and at the end of 3rd and 6th months. Pure tone averages were compared for pre and post therapy. The outcome measure were improvement in hearing which is confirmed by PTA, improvement in symptoms of tinnitus and vertigo or failure of treatment.

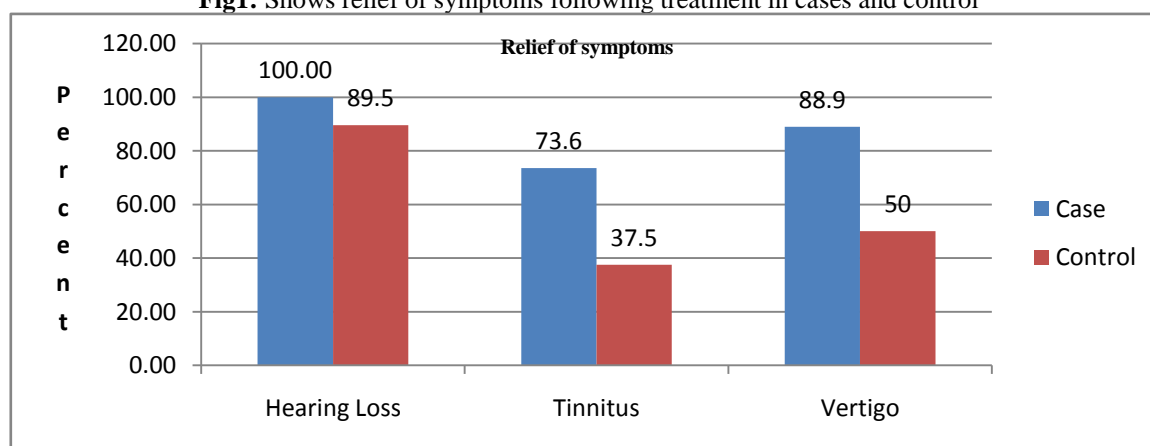
Efficacy of treatment was categorized according to Siegel's criteria on the basis of final PTA as follows: 1) complete recovery: final threshold more than 25 dB 2) Partial recovery: gain of more than 15 dB, final hearing threshold 25 to 45 dB 3) Slight improvement: gain of more than 15 dB, final hearing threshold more than 45 dB 4) No improvement: gain of less than 15 dB and final hearing threshold more than 75 dB. The observations of the study were recorded in data base programme. Descriptive statistics like mean and percentage and statistical analysis was carried out using SPSS version 21 and with the help of Chi- square test, cross tabulation test.

III. Results

Out of seventy patients 35(50%) were males and 35(50%) were females out of which 17(48.5%) males are in treatment, 18(51.4%) males are in control group and 18 (51.4%) females are in treatment, 17 (48.55%) females are in control group. In the study mean age, of sudden sensorineural hearing loss was 42.2 yrs with a standard deviation of 13.9. Urban population constitutes 68.6% and rural constitute 31.4 % of the study subjects. Maximum numbers of patients were Hindu comprising 68.6%, followed by Christian with 25.7% and Muslim with 5.7%. Most prevalent complain among study subjects with sudden sensorineural hearing loss was tinnitus (61.4%), followed by vertigo (30%). Most commonly right ear 41(58.6%) was affected. Out of 70 patients, 20 (28.6%) patients suffered from recent upper respiratory tract infection. Only 10(14.3%) patients had family history of sensorineural hearing loss. 13(18.6%) patients had mild hearing loss, 21(30.0%) patients had moderate hearing loss, 20(28.6%) patients had moderately severe hearing loss, 15(21.4%) patient had severe hearing loss, 1(1.4%) patients had profound hearing loss.

Fig 1 shows relief of symptoms following treatment in cases and control. Hearing improvement was seen in 100 % of treatment group, and 89.5% of the control group. Tinnitus was improved in 73.6% of treatment group, and 37.5% of control group. Vertigo was improved in 88.9 % of treatment subjects and 50% of control group.

Fig1: Shows relief of symptoms following treatment in cases and control



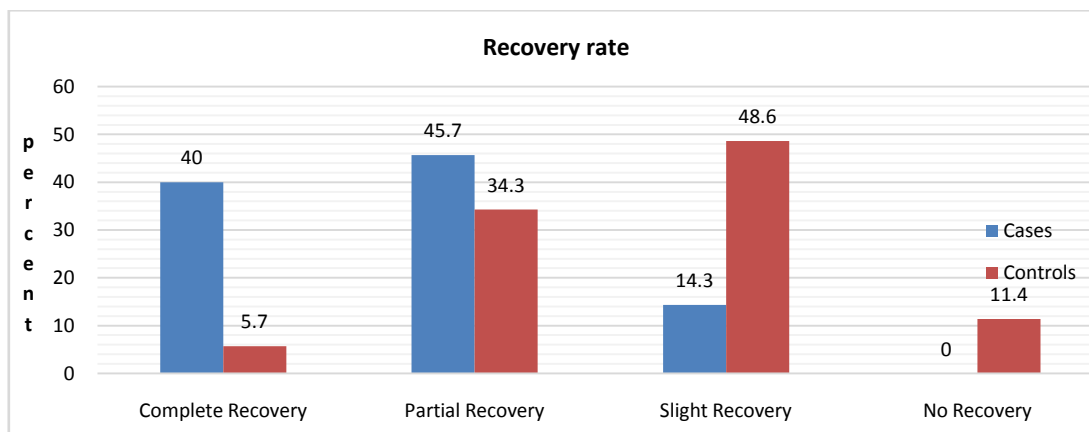


Fig 2 :Showing Recovery rates in control and cases.

Fig 2 shows complete recovery was observed in 40% of treatment group and 5.7% in control group. Partial improvement was seen in 45.7% of treatment group, and 34.3% in the control group, slight recovery in 14.3% of the treatment group and 48.6% in the control group. No recovery was observed in 0% of the treatment group and 11.4% of the control group.

Fig 3 depicts the relationship in recovery rate in different age group in case group. In 18-25 yrs group 33.3% patients showed complete recovery, 66.7% showed partial recovery was seen in treatment group and 100% showed slight improvement was seen in the control group. In the 26-45 yrs group 47.8% complete recovery, 39.1% partial recovery, 13.1% slight improvement was seen in the treatment group, and 13.3% complete recovery, 53.3% partial improvement, 26.6% slight improvement, 6.6% no recovery was seen in the control group. In the age group of more than 45 yrs there is 22.2% complete recovery, 55.5% partial improvement, 22.2% slight improvement in treatment group and 22.2% partial improvement, 61.1% slight improvement and 16.7% no recovery was observed in control group.

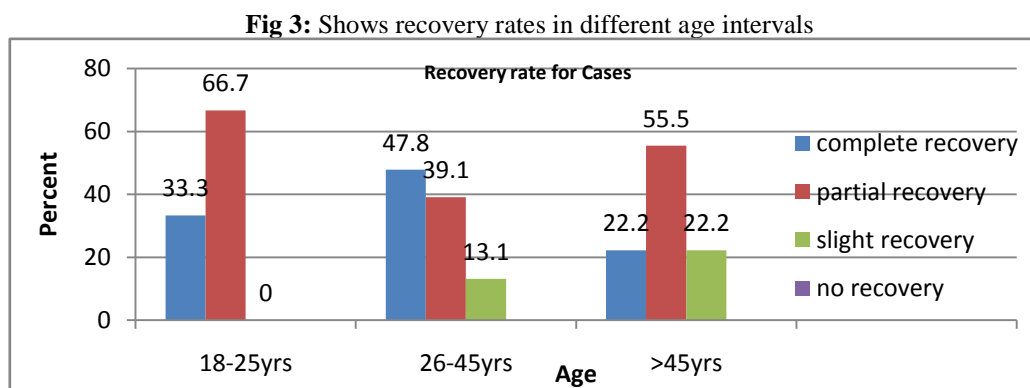


Fig 3: Shows recovery rates in different age intervals

Fig 4 shows 70% patients shows complete recovery in pts with mild hearing loss and 30% shows partial improvement in the treatment group whereas 100% partial improvement in the control group. Similarly in moderate degree of hearing loss 36.4% complete recovery, 63.6% partial improvement occur in the treatment group whereas 20% complete recovery, 60% partial improvement, 20% slight improvement was seen in the control group. In the moderately severe hearing loss group 27.3% complete recovery, 54.5% partial improvement, 18.2% slight improvement was seen in the treatment group, and 22.2% partial improvement, 77.8% slight improvement occur in the control group. In severe hearing loss group 100% slight improvement occur in the treatment group, and 7.7% partial improvement, 61.5% slight improvement, 30.8% no recovery occur in the control group. In profound degree of hearing loss there was 100% slight improvement in the treatment group where no patients were recorded in the control group.

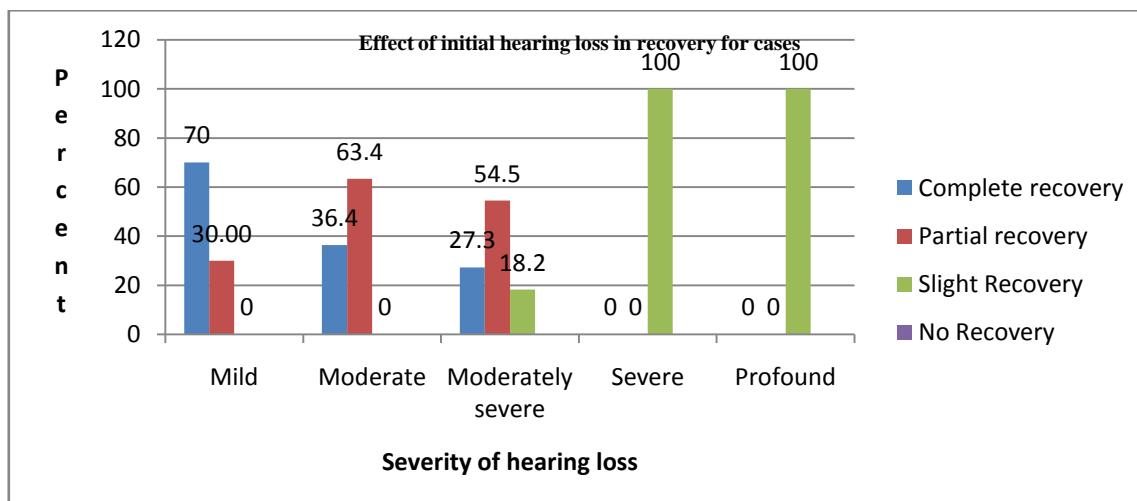


Fig 4: Showing effect of initial hearing loss on recovery

IV. Discussion

Management protocols of idiopathic sudden sensorineural hearing loss (ISSNHL) remains the most challenging subject. Presently there is no definite consensus for management of this problem. This may be due to different treatment protocols and definitions of recovery. ISSNHL affects a wide range of ages but it is more commonly seen between ages of 30 and 50 years^{6,7}. In our study most of the subjects were in age group of 26-45 yrs with a mean age of 42.2 ± 13.9 yrs. Edizer et al in their study reported older age (>60 years) as having negative prognostic impact with 55.9% of the cases in this age group having no recovery⁸. By contrast, younger patients were reported to have a better prognosis by some authors. In 18-25 yrs, 33.3% complete recovery in treatment group. In age group >45 yrs there is 22.2% complete recovery. The type of the audiogram curve has also been investigated as a prognostic factor in many previous studies. Downward sloping (greater hearing loss at high frequencies) has been reported as a negative prognostic factor, whereas upward sloping (low frequency hearing loss) has been related to a better prognosis^{9,10}.

Recovery (complete, partial, slight) occur in all the age group in the treatment group but 16.7% and 6.6% failed to improved from hearing loss in control group in the age group of above 45 yrs and 26-45 yrs respectively.

Various studies have considered the coexistence of vestibular symptoms as a negative prognostic factor^{1,2,8,11,12}. The involvement of the superior vestibular pathway and extensive damage of the inner ear may be responsible for the appearance of vertigo in ISSNHL^{2,13}. In our study, a total of 21 patients (30%) of both groups had vestibular symptoms and symptoms were relieved in 88.9% of treatment group whereas 50% were relieved in control group, but no significant correlation to prognosis was noted. This result was also supported by some previous reports^{14,15}.

Forty three patients in this study (61.4%) presented with tinnitus along with hearing loss. Out of which 73.6% relieved from tinnitus after treatment in the treatment group, whereas only 37.5% relieved from symptoms in the control group. However it did not affect the hearing outcome of patients with or without tinnitus. This finding is in accordance with some previous studies^{14,15}. In some studies tinnitus has been reported as a prognostic factor correlated with better recovery rates.¹⁹

Definition of recovery is a matter of debate in reporting and comparing the results of ISSNHL cases. Criteria may include the absolute decibel (dB) gain or relative dB gain (percentage of improvement), or may use the contralateral ear as a reference. In our study, we used Siegel's criteria because they include both the hearing gain and the residual hearing status of the patient.

The correlation between the degree of initial hearing loss and recovery has been well established^{16,18}. In the present study, patients presenting mild hearing loss had the highest rate of complete recovery (70%) in the treatment group and highest rate of no recovery (30.8%) occur in severe degree of hearing loss in the control group.

In a study by Psifidiset al¹⁶, the overall recovery rate was reported as 35%. However, in other studies by Lee et al⁶ and Edizer et al⁸, recovery rates were reported as 67.8% and 59% respectively. In these studies, Siegel criteria were utilized for the recovery definitions. In our study, by this criteria recovery rate is 40% complete recovery, 45.7% partial improvement, 14.3% slight improvement and 0% no recovery in the treatment group whereas in the control group there is 5.7% complete recovery, 34.3% partial improvement, 48.6% slight improvement and 11.4% no recovery.

Some authors have suggested time between the onset of hearing loss and treatment to be an important prognostic factor. Increased chances of permanent damage to hearing loss with time have been suggested^{7,10}. Beginning treatment 10 days after the onset of hearing loss is related to a worse prognosis. A delayed onset of treatment is reported to be a negative prognostic factor in many previous reports^{7,9,10,18}. In our study, all treatment were started within 3 days in the treatment group and showed improvement in hearing in all the patients with complete recovery of 40%. In the non treated(control) group improvement was seen in 88.5% with complete recovery only 5.7%.

V. Conclusion

Age, degree of initial hearing loss, time period between the onset of hearing loss and treatment have all been shown to affect the prognosis of sudden hearing loss in our study. In our study oral steroids, antiviral and methylcobalamin injection has proved to be an effective treatment regime. Larger sample size could have contributed to more statistically significant results.

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IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 3, 2018, pp 35-39.