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Sudden Sensorineural Hearing Loss

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The Outcome of Intratympanic Dexamethasone Treatment on Idiopathic Sudden Sensorineural Hearing Loss

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Introduction: Sudden sensorineural hearing loss is a frustrating symptom which when detected early can be treated with oral, intra venous or intra tympanic steroids. **Objective:** To assess the effectiveness of intra tympanic steroid injection in idiopathic sensorineural hearing loss. **Method:** A follow-up study done was among patients satisfying the case definition of idiopathic sudden sensorineural hearing loss. 35 Patients were evaluated by taking clinical history and performing complete physical examination. Pure tone audiogram was performed before and after intratympanic dexamethasone injection and recovery was analyzed. **Result:** After statistical analysis overall outcome of the hearing was found better with intratympanic dexamethasone injection therapy. **Conclusion:** Intratympanic dexamethasone therapy was useful in patients with idiopathic sudden sensorineural hearing loss.

Keywords: Idiopathic sudden sensorineural hearing loss, Intratympanic dexamethasone injection

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Introduction

Sudden sensorineural hearing loss is a frightening and frustrating symptom of patients. Based on the 2011 Indian census, it has been estimated that there are about 50 lakh people with hearing disabilities. About 15,000 new cases are reported annually worldwide accounting for approximately 1 % of all cases of sudden sensorineural hearing loss [1]. Idiopathic sudden sensorineural hearing loss is an abrupt sensorineural hearing loss of at least 30 dB in at least 3 contiguous audiometric frequencies, variably defined as developing in 12 hours or less, 24 hours or less, or in 3 days or less. [2].

Recovery was defined based on Siegel's criteria which are as follows.

- "Complete recovery" was defined as more than 30 dB hearing gain and as final hearing better than 25 dB.
- "Partial recovery" as more than 15 dB hearing gain and as final hearing between 25 and 45 dB.
- "Slight improvement" as more than 15 dB hearing gain but with a final hearing poorer than 45 dB.
- "No improvement" as less than 15 dB hearing gain and final hearing poorer than 75 dB. [3].

Causes of Sensorineural hearing loss:

Cochlear: Inflammatory:

Traumatic

Haematological

Vascular

Ototoxicity

Meniere's disease

Retrocochlear:

Meningitis.

CNS tumours [4].

Although systemic steroids in sudden sensorineural hearing loss (SSNHL) appears to be the most effective and the most widely accepted treatment today, a significant number of patients do not respond to steroid treatment or cannot receive steroids for medical reasons. Intratympanic (IT) administration of steroids appears to Be an alternative or additional method of management without the side effects of intravenous steroids [2]. This study aims in investigating the outcome of intratympanic steroid administration as a primary treatment modality for idiopathic sudden sensorineural hearing loss.

Aims and Objectives: To find out the outcome of intratympanic dexamethasone on the treatment of idiopathic sudden sensorineural hearing loss.

Materials and methods

A prospective study was conducted in the department of ENT in a tertiary care hospital. All Patients 20-60 years diagnosed of having idiopathic sudden sensorineural hearing loss were selected for Intratympanic dexamethasone therapy.

Study setting: Department of Otorhinolaryngology, TDMCH, Alappuzha.

Duration and type of study: 18 months duration (December 1, 2015, to May 30, 2017) and it is a follow-up study.

Sampling method: Convenient Sampling.

Sample size calculation: Patients in the age group 20-60 years diagnosed to have idiopathic sudden SNHL were selected for Intratympanic dexamethasone injections during the period 01/12/2015 to 30/05/2017.

Inclusion criteria: All patients of age group 20 to 60 years who came to ENT OPD and satisfied the case definition**.**

Exclusion criteria: Patients with Meniere's disease, retrocochlear disease, autoimmune hearing loss, trauma, fluctuating hearing loss, radiation-induced or noise-induced hearing loss, or any other identifiable etiology for sudden hearing loss were excluded from the study**.**

Data Collection Procedure: Patients were clinically evaluated with detailed history and complete physical examination. A pure Tone Audiogram (PTA) was performed. Under aseptic precautions, the patient was positioned with the diseased ear up. A cotton ball soaked in 4% Lignocaine was placed over the tympanic membrane 30 minutes before the injection of the steroid. Intratympanic dexamethasone (Dose: 0.5cc) is given in the posteroinferior quadrant using an 18G green cannula needle. Patients were observed

For the next 30 minutes for any giddiness or discomfort and allowed to go home. Patients should lie in a supine position with their heads tilted up for 2 hours. PTA was recorded 5 days after injection.

Ethical considerations: Permission to conduct the study will be obtained from the Institutional Ethics Committee and Institutional Research Committee of TDMCH, Alappuzha. The study will be commenced after getting clearance from the Human Institutional Ethics Committee. Consent was obtained from all the patients who participated in the study.

Statistical analysis: Data obtained was entered in Microsoft Excel and analysed using SPSS Software version 18. Association between dependent and independent variables was tested using an appropriate test of significance. Data obtained was be entered in an open office spread sheet and analyzed using appropriate statistical tests.

Observation and Analysis: This study started with 36 patients who were diagnosed as cases of Idiopathic sudden sensorineural hearing loss. The study was carried out among patients coming to the Department of Otorhinolaryngology, TDMCH, and Alappuzha from December 1 2015 to May 30 2017. PTA is recorded at the time of presentation. Intratympanic Dexamethasone injection 0.5cc was given. PTA was recorded 5 days after injection. The main focus of the study was to assess the outcome of intratympanic dexamethasone injection on ISSNHL.

Age distribution of the patients: Both males and females of age group 20-60 years who came to ENT OP and satisfied the case definition were included in the study. The youngest one is 20 years and the oldest is 60 years. The mean age of patients participating in this study was 40.72 with a standard deviation of 12.18. The majority belonged to the age group 20-40 years (19). Among patients in the age group 20-40 years, 2 had complete recovery, 5 had partial recovery, 6 had a slight recovery, and 4 had no recovery. Bivariant analysis was done with one group where there was no recovery and the other group included slight, partial and complete recovery. The recovery rate of age groups was studied and it showed no significant difference (chi-square = 0.02, p-value = 1).

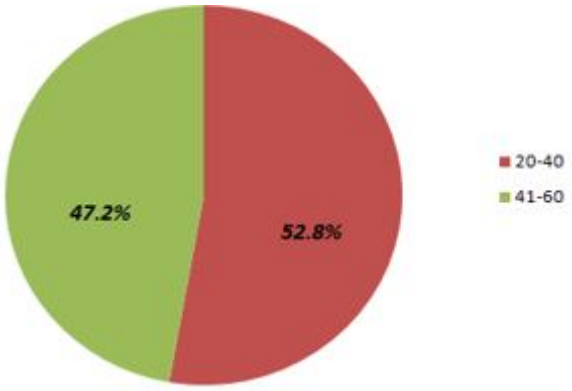

Figure 1: Age distribution of patients.

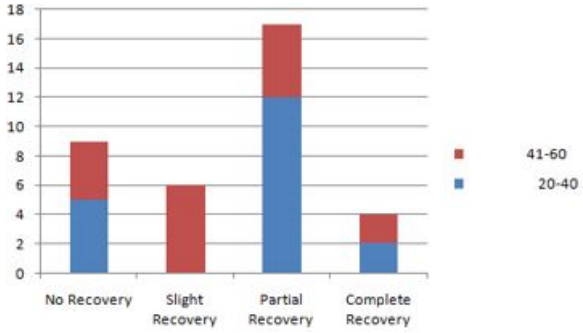

Figure 2: Recovery of patients who received intratympanic dexamethasone treatment according to age group.

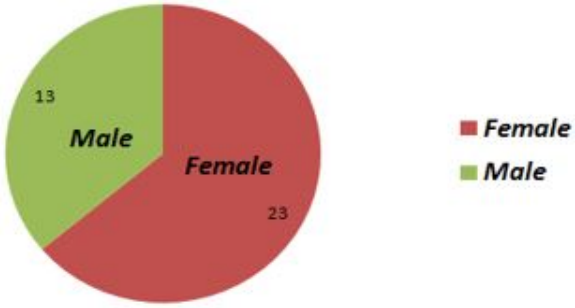

Figure 3: Sex distribution of patients.

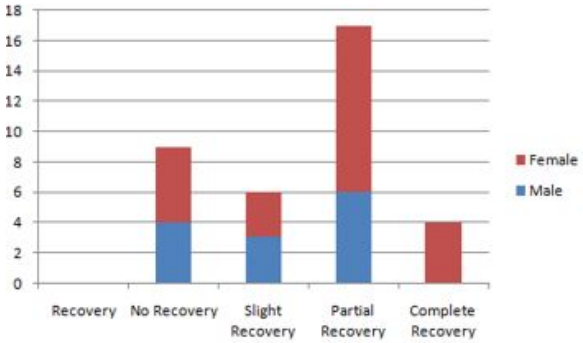

Figure 4: Recovery Rate among males and females.

The outcome of intratympanic dexamethasone treatment on ISSNHL: Among 36 patients who were received Intratympanic Dexamethasone therapy, 9 patients had no recovery, 6 patients had a slight improvement in hearing, 17 patients had partial recovery, and 4 patients had complete improvement in hearing. Among 36 patients one patient had mild hearing loss (WHO) before injection, recovered completely. Among 15 patients who had moderate hearing loss before injection, the majority (9) had partial recovery, and 2 had complete improvement in hearing. In 6 patients who had moderately severe hearing loss before injection, 4 patients recovered partially. Among 11 patients who had severe hearing loss before injection, 4 had partial recovery. Among 3 patients, who had profound hearing loss before treatment, 2 had no improvement in hearing.

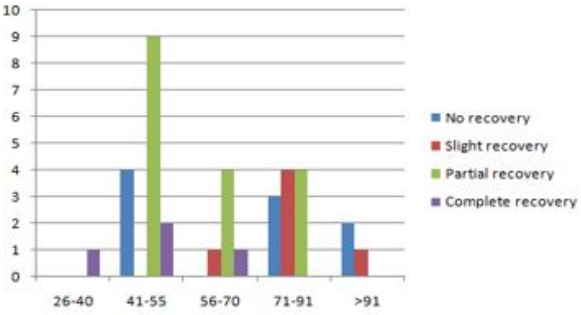

Figure 5: Recovery according to pretreatment Hearing loss.

Paired t-test was done for PTA before and after intratympanic Dexamethasone therapy. There is a significant difference between these PTA (df = 35, p-value <0.05).

Results

Both males and females of age group 20-60 years ENT OP patients and satisfied the case definition were included in the study. Bivariant analysis was done with one group where there was no recovery and the other group which included those with slight, partial and complete recovery. The recovery rate of age groups was studied and it showed no significant difference (chi-square = 0.02, p-value = 1). The recovery rate of males and females were studied and it showed no significant difference (chi-square = 0.34, p-value = 0.7). Among 36 patients who were received Intratympanic Dexamethasone therapy, 9 patients had no recovery, 6 patients had a slight improvement in hearing, 17 patients had partial recovery, and 4 patients

Had complete improvement in hearing. Among 36 patients one patient who had mild hearing loss (WHO) before injection, recovered completely. Among 15 patients who had moderate hearing loss before injection, the majority (9) had partial recovery, and 2 had complete improvement in hearing. In 6 patients who had moderately severe hearing loss before injection, 4 patients recovered partially. Among 11 patients who had severe hearing loss before injection, 4 had partial recovery. Among 3 patients, who had profound hearing loss before treatment, 2 had no improvement in hearing. Paired t-test was done for PTA before and after intratympanic Dexamethasone therapy. There was a significant difference between these PTA (df = 35, p-value <0.05).

Discussion

Among 36 patients who took part in the study, the intratympanic dexamethasone therapy proved to be successful in treating ISSNHL. The main aim of the study was to find out the outcome of intratympanic dexamethasone on ISSNHL and thus to make wider use of it in our outpatient setting and thus to reduce the prevalence of ISSNHL. The use of intratympanic steroids is a known procedure. Itoh and Sakata first reported its use in 1991 in the treatment of patients with Meniere's disease. In 1996, Silverstein described the first use of Intratympanic therapy in SSNHL. The reason supporting intratympanic drug administration is the round window membrane permeability to the drugs. Elevated perilymph concentration of steroids can be achieved after transtympanic administration, higher than after systemic administration. [4-6]. A recent prospective clinical trial (Fu et al, 2011) evaluated 66 subjects with sudden profound unilateral sensorineural loss of less than 2weeks duration. All subjects received a 9-day course of intravenous steroids, a 7-day course of Prostaglandin E1 intravenous infusion, and 30 days of hyperbaric oxygen therapy. Following this therapy regimen, subjects were offered additional IT therapy. Twenty-two subjects elected IT steroid therapy, and 44 declined (control group). Audiograms obtained before treatment and 30 days post-treatment revealed a 30 dB or greater recovery rate of 77.27% for the IT group and 81.81% for the control group (nonsignificant); however, examination of data reported by the authors suggests 5–10 dB greater improvement in the IT group than the control

Group in the primary speech frequencies (500, 1000, and 2000 Hz). [7]. Whitaker studied the therapeutic efficacy of intratympanic dexamethasone (ITD) injections added to systemic steroids in patients with idiopathic sudden sensorineural hearing loss (HL). The ITD group showed significantly better hearing improvement at 250 Hz than the control group. [8].

Chandrasekhar SS studied the value of intratympanic dexamethasone (IT-DEX) perfusion for sudden sensorineural hearing loss (SSNHL), clinically and in an animal model.IT-DEX results in significant hearing improvement and significantly higher perilymph concentration of steroid than IV Dexamethasone. [9].

Seggas studied by literature review from 1996 to 2009, PubMed and Medline. Based on the available literature, it seems that topical steroids can be a valuable solution for ISSNHL patients who either cannot tolerate systemic steroid therapy or are refractory to it. [10]. Plaza G &HerraizC conducted a nonrandomized prospective clinical trial that showed improved hearing with Intratympanic steroid treatment. [11]. Herr BD & Marzo S J conducted a retrospective case review was performed on 17 patients who presented with sudden sensorineural hearing loss refractory to oral steroid therapy. Nine patients with sudden sensorineural hearing loss showed an improvement with intratympanic steroid therapy. [12].

Ahn J H, Han MW, Kim JH, Chung JW and Yoon TH conducted a study on therapeutic effects over time of intratympanic dexamethasone as salvage treatment of sudden deafness. They retrospectively reviewed the medical records and audiograms of 99 SSNHL patients who were refractory to 2 weeks of oral steroid treatment, from August 2003 to October 2006. Patients were divided into those receiving no further treatment (control group) and those receiving ITD within 2 weeks (early-ITD), between 2 weeks and 1 month (mid-ITD), and between 1 and 2 months (late- ITD) after initial treatment failure. Overall hearing improvement was observed in 8 of 50 (16.0%) control patients, 7 of 16 (43.8%) early ITD patients, 6 of 20 (30.0%) mid ITD patients, and 2 of 13 (15.4%) late ITD patients. [13].

Key Findings: The study was successful in this regard by getting a good recovery rate after intratympanic dexamethasone therapy in this study, 15 patients who had moderate hearing loss before injection, 9 had partial recovery. In this study, the majority belonged to the age group 20-40 years. Among 19 patients in the age group of 20-40 years who received intratympanic dexamethasone therapy, 12 had partial recovery. Among 17 patients in the age group 41-60 years who received Intratympanic dexamethasone therapy, 6 had a slight recovery, 5 had partial recovery. No significant difference in the recovery rate of age groups (p-value = 1) and among males and females (p-value = 0.7). Hence patients with idiopathic sudden sensorineural hearing loss should be investigated promptly and early treatment with Intratympanic dexamethasone gives a good recovery of hearing threshold.

Conclusions

The Outcome of Intratympanic Dexamethasone Treatment on Idiopathic Sudden Sensorineural Hearing Loss was successful with a good recovery rate in ISSNHL. The majority of patients had partial recovery following ITD therapy. There was no significant sex and age difference in recovery rate for ITD treatment in ISSNHL Majority of patients had moderate hearing loss before ITD injection and among these majority had partial recovery after ITD administration. ITD therapy can be considered a good option in ISSNHL without any significant side effects.

What this study add to existing knowledge?

This study highlights the need for early diagnosis of Idiopathic Sudden Sensorineural Hearing Loss as prompt treatment with intratympanic steroid yields successful recovery in most of the cases.

Contribution by authors: The study was planned and guided by Dr. Yamuna R. The procedure was done by Dr. Archana UM. Data analysis was done by Dr. Shaiju A. Pure Tone Audiograms were performed by Ms. Chippy Mohan.

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