

Effect of intratympanic dexamethasone in idiopathic sudden sensorineural hearing loss concurrent with oral steroids

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Abstract

Aims and Objectives: To assess demographic factors involved in outcome in patients receiving intratympanic injection for ISSNHL To determine effect of co-morbidity like Diabetes mellitus and Hypertension on the outcome of patient receiving intratympanic injection. To assess improvement after 3rd dose and 6th dose intratympanic injection by audiological evaluation using pure tone audiometry.

Key Word: intratympanic dexamethasone.

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INTRODUCTION

Sudden hearing loss (SHL) was first described by de Kleyn in 1944 and defined as a hearing loss of at least 30 dB in three sequential frequencies in the standard pure tone audiogram over three days or less. It may be characterized as an impairment of the inner ear and/or central auditory pathways, with variable intensity and frequency, ranging from mild feeling of ear being clogged to total loss of hearing. Although it is thought to originate mainly from viral, vascular, or immunologic causes, the etiopathogenesis of the disease is still unknown, so the disease is usually referred to as idiopathic sudden hearing loss (ISHL). It has a reported incidence of 5--20 per 100,000 patients per year, with a mean of 50-60 years and

no predominance of sex. In most cases, there is unilateral hearing loss, with bilateral involvement reported in less than 5%. Recovery rate in untreated patients ranges from 25% to 50%, mostly resolving within two weeks of onset of symptoms. Although the methods of treatment of SHL patients vary among different centers, systemic steroid (SS) therapy is the most commonly used modality for treatment of sudden hearing loss. The treatment of sudden hearing loss is based on its etiology. In idiopathic cases, oral corticosteroids are widely used; intratympanic steroids have been trialed in patients with sudden hearing loss, because they provide a high concentration in the labyrinth in animal models, although their results are conflicting. Intratympanic steroid has become an attractive alternative, especially in cases when systemic therapy fails, or to avoid the side effects of the systemic use of steroids. However, the standardization of number and frequency of intratympanic treatments and drug delivery methods remain to be determined. Many treatments for ISSHL have been tested and found ineffective. These include hyperbaric oxygen, agents that decrease blood viscosity (osmotic diuretics, pentoxifylline, procaine, and heparin), vasodilator drugs (histamine, papaverine, verapamil, and carbogen), free radical scavenging vitamins, gingko biloba, and magnesium. At this time, the only treatment for ISSHL

shown effective in controlled clinical trials is systemic corticosteroid therapy with high dose of prednisone taper. The reported success rate is around 50 to 80%, whereas the spontaneous recovery rate is approximately 30 to 60%. Despite high reported spontaneous recovery rates, the practical experience of many otologists suggest that, hearing recovery is poor in those patients who have failed systemic intravenous therapy

Advantages

1. Outpatient procedure- general anesthesia can be avoided.
2. Easily administered
3. It can be given soon after diagnosis
4. Relatively painless
5. Possible use in patients in which corticosteroids are contraindicated (e.g.: immune suppression, HIV, tuberculosis, diabetes)
6. High drug concentration when administered directly on the affected ear
7. relatively easily accepted concept by patients.

Disadvantages/ Complications

1. Invasive procedure
2. Tympanic membrane perforation
3. Pain
4. Otitis media
5. Vertigo (generally temporary)
6. Hearing loss

Grading Of Severity Of Hearing Loss

- Mild: 26-40dB
- Moderate: 41-55 dB
- Moderately severe: 56-70 dB
- Severe: 71-90 dB
- Profound : > 90 dB

MATERIALS AND METHODS

A retrospective study from October 2017 to October 2019, was conducted in Sapthagiri Institute of Medical Sciences an Research Centre, Benagluru. 35 patients who were diagnosed with sudden unilateral SSNHL received intratympanic dexamethasone injection under endoscopic examination of affected ear. Six injection protocols were employed: injection of 2 ml dexamethasone (5 mg/ml) three times a week (alternate day regimen) for a total of 6 doses. Oral steroid dexamethasone 8mg twice daily for 1 week and dose was gradually tapered. Multi vitamin tablets were also given orally. Hearing recovery was assessed by pure tone audiogram done after 3rd injection and 6th injection. Ethical clearance was obtained from the institute's ethical clearance committee. Informed consent was taken from the cases after explaining the procedure.

Procedure: The patient is positioned in the supine position. With a 26 gauge 1 &1/2 inch long needle and

Tuberculin syringe, a puncture was made in the posterosuperior quadrant .2 ml of dexamethasone injection (5mg/ml) was injected through this site. Patient should avoid the swallowing reflex and patient should remain in the same position with head tilted 45 degrees to the opposite side for 15 to 20 minutes

Inclusion Criteria

1. Patients who had a sensorineural hearing loss of at least 30 dB in 3 contiguous frequencies occurring in less than 72 hours, idiopathic SNHL
2. Those who presented after 1- 7 days of onset of hearing loss, previously untreated, with normal hearing in contralateral ear
3. Those with negative serological studies for infective and inflammatory diseases (syphilis, autoimmune antibodies, rheumatoid factor)
4. Those with normal magnetic resonance imaging (MRI) with contrast of the brain and internal auditory canals were included in the study

Exclusion criteria

1. with history of chronic otitis media, Meningitis, Meniers diseas
2. Those with fluctuating hearing loss
3. History of previous ear surgeries
4. History trauma (head, acoustic, bariatric)
5. History of exposure to radiation
6. Intakes of ototoxic medications
7. Patients not willing for intratympanic injection.

RESULTS

Out of 33 cases that were taken for study,

1. 40% of patients were under 40-50 years age group, followed by 25.7% under age group of 30-40 years. No patients were below 10 years or above 60 years
2. ISSNHL was more common in females (65.71%) than males(34.28)
3. ISSNHL was more common in left ear (48.57%) than right ear(34.28%). Though B/L was rare, it was found in 17.14% of the patients
4. Incidence of diabetes mellitus found to be 8.57% and no audiological improvement was found. Incidence of hypertension was found to be 22.85% and one patient showed improvement of 10-20dB.
5. Out of all cases, 48.57% patients showed improvement of less than 10dB after 3rd dose of intratympanic injection. 42.85% patients showed 10-20dB improvement after 6th injection out of which 11 were females and 4 were males. Only 25.21% showed improvement of 20-30dB after 6th dose of intratympanic injection. Only 9.09% showed improvement of >40 dB after 6th dose.

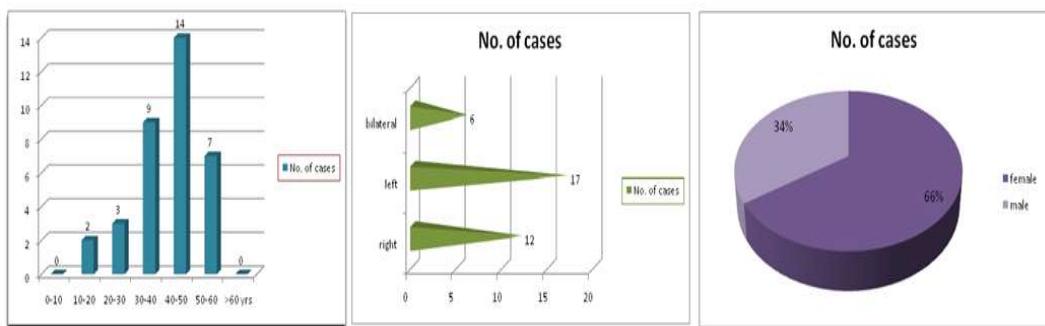


Figure 1: Graph depicting age preponderance; **Figure 2:** Graph depicting the affected ear; **Figure 3:** Graph depicting sex preponderance

Table 1: Table showing incidence of co-morbidities associated with ISSNHL

Co-morbidity	Cases	Percentage
diabetes mellitus	3	8.57%
hypertension	8	22.85%

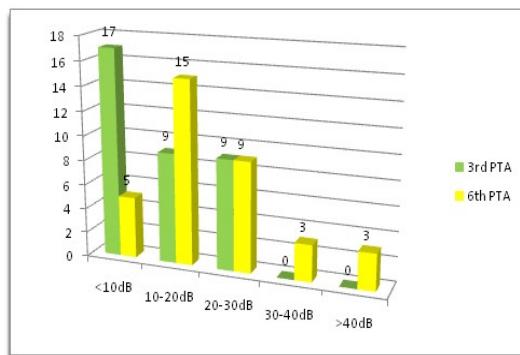


Figure 4: Graph depicting audiological improvement after 3rd dose and 6th dose of intratympanic injection. In 6th PTA, out of 15 who had improvement of 10-20dB, 11 were female and 4 were male.

CONCLUSION

Sudden SNHL is an otologic emergency. If treated at correct time, it can be potentially reversed. Currently, steroids are the most potent medication used in treating sudden SNHL. The main purpose of using steroids in sudden SNHL is activation of all the glucocorticoid receptors in the cochlea. By definition, ISSNHL is from an unknown etiology and is a result of multiple unknown causes. Within this heterogeneous group, there are likely to be early, late, and non-responders to steroid treatment. There may also be a number of patients who are recovering spontaneously, regardless of steroid therapy. This has been reported to be somewhere between 31% and 65%. In our study we can conclude that female preponderance is more than males and most commonly affected in the 4th decade. Left ear is more affected than right ear. Presence of co-morbidities like diabetes and hypertension hinder the effect of intratympanic injection. Majority of the patients showed significant improvement of 10-20dB after 6th dose.

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