

## ORIGINAL ARTICLE

### Use of Intratympanic Dexamethasone as a Salvage Treatment in Idiopathic Sudden Hearing Loss

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**Objective:** We aimed to assess effect of intratympanic dexamethasone treatment on hearing in the patients who did not respond to conventional systemic treatment of idiopathic sensorineural hearing loss (ISHL).

**Materials and Methods:** Fourteen consecutive patients with ISHL who did not respond to conventional parenteral treatment (methyl-prednisolone 3 mg/kg/day which was tapered after 10 days, and acyclovir 3 gr/day for two weeks) were treated with intratympanic dexamethasone, and evaluated with pure tone audiometry.

**Results:** The PTAs on initial admission and after completion of the parenteral treatment were 80.9 and 71.64 dB, respectively ( $p>0.05$ ). The PTA recovered to 57.1 dB after intratympanic injection, which was significantly better than with the parenteral treatment ( $p<0.05$ ). No serious complication was encountered.

**Conclusion:** Intratympanic steroid injections can be used safely and successfully in patients who do not response to the conventional intravenous treatment. It can also be applied as the treatment of choice in ISHL, especially in patients who have contraindication to systemic treatment with corticosteroids.

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## Introduction

Idiopathic sudden hearing loss (ISHL) is defined as a sensorineural hearing loss of 30 dB or more at least three contiguous frequencies, which develops over a period of a few hours to 72 hours<sup>[1]</sup>. Its incidence is 5-20/100.000 or 4,000 new cases per one year<sup>[2]</sup>. Almost 98% of the patients are affected unilaterally<sup>[3]</sup>. Although viral infections, vascular disorders, rupture of cochlear membranes, immunologic diseases and otologic neoplasms are reported as etiologic factors, it is mostly idiopathic<sup>[4,5]</sup>. A spontaneous recovery can be seen in 30-60% of the patients<sup>[6]</sup>.

Systemic steroids have been the gold standard in the treatment. Various medications like vasodilators, antivirals can be used in the treatment as an adjunct to systemic steroids<sup>[7,8]</sup>. Steroids inhibit the inflammatory reaction in the cochlea in ISHL<sup>[9]</sup>. However, intravenous application of steroids can cause serious

side effects even in otherwise healthy patients. This is one of the major drawbacks of systemically applied corticosteroids. On the other hand, intratympanic administration of corticosteroids in ISHL can be mostly used both more affect into the cochlea and to reduce systemic adverse affects<sup>[10-12]</sup>.

In this study, we aimed to assess effect of intratympanic dexamethasone treatment on hearing in the patients who did not respond to conventional systemic treatment of ISHL.

## Materials and Methods

Between February 2005 and February 2007, 14 consecutive patients with ISHL who did not respond to conventional parenteral treatment were included in this study. The previous parenteral treatment included methyl-prednisolone 3 mg/kg/day which was tapered after 10 days, and acyclovir 3 gr/day for two weeks. None of the patients had any underlying cause that

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could lead to ISHL such as pontocerebellar pathology, ototoxicity, trauma or otologic surgery, as proved by history, physical examination, blood biochemistry and magnetic resonance imaging of the temporal bone.

On audiological evaluation, pure tone and speech audiometry was performed. Pure tone averages (PTA) were calculated at the frequencies of 250, 500, 1,000, 2,000 and 4,000 Hz. Audiometry was performed in the 1st (admission), 5th and 10th days, and after completion of parenteral treatment. Intratympanic treatment was performed unless a hearing improvement could be achieved.

**Intratympanic treatment:** As a routine in our clinical practice, intratympanic treatment was performed after two weeks of parenteral treatment in the patients who did not have any recovery on audiological assessment. Under local anesthesia, a myringocentesis was performed in the anterior superior quadrant of the eardrum, and 2 cc (8 mg) dexamethasone (Dekort®) was injected through the posterior inferior quadrant. After completion of the injection, the patient is allowed to lie on the table for 45 minutes with the head tilted 45° to the contralateral site. The procedure was repeated once a week for three times.

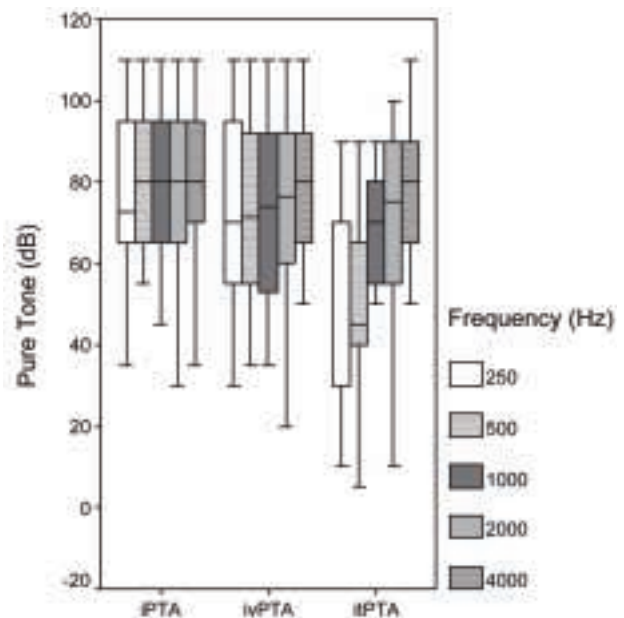
**Statistics:** The pre and post treatment audiometry results were compared using paired t-test.

## Results

There were 2 female (14.3%) and 12 male (85.7%) patients, with a mean age of 43.9 years (ranged from 17 to 79 years). The mean time elapsed between the onset of the disease and commencement of the initial treatment was 5.3 days (ranged from 1 to 14 days). The mean time elapsed between the onset of disease and commencement of intratympanic treatment was  $32 \pm 4$  days. There was no systemic disease in 10 patients (71.4%) while there was diabetes mellitus and hypertension in 3 (21.4%) and 1 (7.1%) of the patients, respectively. There was tinnitus and vertigo in 11 (78.6%) and 5 (35.7%) patients, respectively.

The PTAs on initial admission and after completion of the parenteral treatment were 80.9 and 71.64 dB, respectively, and there was no statistically significant

difference between the pre and post treatment PTAs ( $p > 0.05$ ). The PTA recovered to 57.1 dB after intratympanic injection, which was significantly better than with the parenteral treatment ( $p < 0.05$ ) (Figure 1). The mean gain was 14.5 dB, and all patients had a gain 10 dB or more. No serious complication was encountered except dizziness, which occurred in 2 of 14 (14.3%) patients and resolved spontaneously.



**Figure 1.** Frequency specific pure tone results of the patients on initial admission (iPTA), after intravenous treatment (ivPTA) and after intratympanic treatment (itPTA).

## Discussion

Systemic use of corticosteroids has been the gold standard in the treatment of ISHL despite some contradictory proposals<sup>[13]</sup>. Recently, local use of corticosteroids with intratympanic administration has been an option in ISHL, especially in cases, which do not respond to conventional treatments. This method avoids the adverse side effects of corticosteroids on gastrointestinal system, eyes, glucose metabolism, hepatic functions and cardiovascular system<sup>[14]</sup>. In addition, intratympanic administration may increase the effectiveness of corticosteroids in the cochlea<sup>[15]</sup>. Decreased systemic toxicity and local applicability seem favorable features of the intratympanic treatment.

Intratympanic treatment proved its effectiveness in ISHL in different studies<sup>[5, 15, 16]</sup>. It can be used as an initial treatment or after failure of the systemic treatment<sup>[17]</sup>. However, there are some questions to be answered in terms of intratympanic corticosteroid treatment in ISHL. These are; 1) type of corticosteroid which will be used such as dexamethasone or methyl-prednisolone; 2) type of application such as once a day for one week or once a week for three weeks; 3) dose of corticosteroid to be instilled into the tympanic cavity; 4) method of drug delivery such as injection with a syringe, use of an infusion pump or ear wick; and 5) time of application as to whether it will be an initial treatment or salvage treatment.

Both methyl-prednisolone and dexamethasone have been used in different studies. Methyl-prednisolone is proved to be effective as a salvage intratympanic treatment in ISHL<sup>[18]</sup>. In this study, we preferred dexamethasone as it is more potent and long acting compared to methyl-prednisolone<sup>[5,15]</sup>. According to our results, it seems that the gain was significant at the frequencies below 4 kHz. Although the gain was better in the low and middle frequencies, the mechanism of this condition is unclear.

Although the side effects of intratympanic treatment are rare, tympanic membrane perforation, acute otitis media, nausea and vomiting can be seen<sup>[9,19]</sup>. Complications of intratympanic corticosteroid injection are rare compared to microcatheter placement in which tympanic membrane perforation, tinnitus and hearing loss are more frequent<sup>[20]</sup>. In this study, there was no serious adverse effect except dizziness that was seen in 14.3%.

In conclusion, intratympanic steroid injections can be used safely and successfully in patients who did not response to the conventional intravenous treatment. It can also be applied as the treatment of choice in ISHL, especially in patients who have contraindication to systemic treatment with corticosteroids.

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