Effectiveness of Intratympanic Steroid Injection in Treatment of Idiopathic Sudden Sensorineural Hearing Loss

ISSN: 3059-9733
DOI: 10.3126/jobh.v1i3.86164

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ABSTRACT

Background

Idiopathic sudden sensorineural hearing loss (ISSNHL) is a rapid-onset condition of unknown cause, often leading to significant morbidity. Intratympanic steroid (ITS) therapy delivers high concentrations of corticosteroids directly to the inner ear while minimizing systemic side effects, making it a promising alternative or adjunct to systemic therapy. The objective of this study is to evaluate the effectiveness of ITS in improving hearing outcomes in patients with ISSNHL and to assess its safety profile.

Methods

A prospective observational study was conducted on 32 adult patients diagnosed with ISSNHL within 72 hours of symptom onset. Participants received ITS (dexamethasone 4 mg/ml, 0.3- 0.5 ml per injection) on every 3-4 days for a total of three sessions over 2 weeks. Hearing thresholds were measured using pure tone audiometry (PTA) at baseline and 2nd weeks post-treatment. Recovery was classified according to Siegel's criteria. Adverse effects were recorded.

Results

Total of 32 patients were enrolled in the study. Complete recovery was achieved in 23 patients (71.8%), partial recovery in 8 patients (25%), and no improvement in 1patient (3.2%). No serious adverse effects were observed; minor transient discomfort was the most common complaint.

Conclusions

ITS is a safe and effective treatment option for ISSNHL, with a high rate of complete recovery when initiated early. These findings support ITS as a primary or salvage therapy in managing ISSNHL.

Keywords: idiopathic sensorineural hearing loss (ISSNHL); intratympanic steroids (ITS); pure tone audiometry (PTA).

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INTRODUCTION

Idiopathic sudden sensorineural hearing loss (ISSNHL) is a rapid onset hearing loss of≥30 dB over at least three consecutive frequencies within 72 hours, often accompanied by tinnitus, aural fullness, or vertigo. Its exact cause remains unclear, with theories including viral, vascular, and autoimmune mechanisms. Early treatment is crucial to maximize recovery.[1] Systemic steroids are widely used but may be unsuitable for patients with certain comorbidities. Intratympanic steroid (ITS) injection delivers high drug concentrations directly to the inner ear while minimizing systemic effects, making it a promising alternative.[2] This study evaluates the effectiveness of ITS in managing ISSNHL in our patient population.

METHODS

This prospective observational study was conducted in College of Medical Sciences, Bharatpur, Chitwan, Nepal after the approval from COMS-TH IRC (IRC number 2025-045) for a period of 6 months (June 2025-November 2025). Patient presenting to Oto-rhinolaryngology OPD with sudden sensorineural hearing loss and falling under the inclusion criteria were included. Based on the published incidence of ISSNHL 32 patients were included in the study. Inclusion Criteria for the study included adults aged 18 years or older diagnosed with idiopathic sudden sensorineural hearing loss (ISSNHL) according to AAO-HNS criteria, with onset within the past 14 days and no prior intratympanic steroid therapy, were included. Patients with identifiable causes of hearing loss such as trauma, Meniere's disease, or acoustic neuroma, those with chronic otitis media, tympanic membrane perforation, prior ear surgery on the affected side, or severe systemic comorbidities contraindicating steroid use were excluded. Patient who presented in ENT OPD between June 10th June 2025 to 10th November 2025with sudden hearing loss and fulfilling inclusion criteria were enrolled in the study. Pre-treatment Pure tone audiometry, clinical history, presence of tinnitus, vertigo, comorbidities and prior treatment were carried out. Patient fit for ITS and falling under inclusion criteriawere enrolled in the study after obtaining informed written and verbal consent. Data was analyzed using students T test for continuous variables and chi-square test for nominalvariables. Values of p-value<0.05 will be considered statistically significant.

RESULTS

A total of 32 patients were included in the study. Among them, 10(31.25%) were female and 22(68.75%) were male. All patients presented with a history of idiopathic sudden sensorineural hearing loss (SSNHL) (Table 1).

Pre-treatment pure tone audiometry (PTA) was performed in all patients prior to initiation of therapy. All patients received intratympanic steroid injections,

Table 1. Demographic factors of patients. (n=32)

Parameter	Frequency (%)
Male	22(68.75%)
Female	10(31.25%)
Mean age ± SD (years)	37.31±13.90

and post-treatment PTA was conducted within 2 weeks following completion of therapy to assess hearing recovery.

The mean pre-treatment PTA was 67.82±13.25 dB, while the mean post-treatment PTA was 36.03±12.51 dB. The mean hearing gain observed was 31.43±10.53 dB, which was statistically significant (p-value<0.001). A total of 32 patients were included in the study, comprising 22 males (68.75%) and 10 females (31.25%). The mean age of the patients was 37.31±13.90 years, ranging from 18 to 74 years.

Based on hearing improvement, most patients showed a clinically meaningful recovery following intratympanic steroid therapy, indicating

Table 2. Effectiveness of intratympanic steroid injection in the treatment of idiopathic sudden sensorineural hearing loss.

Parameter	Mean ± SD (dB)
Pretreatment PTA	67.82±13.25
Post-treatment PTA	36.03±12.51
Mean Hearing Gain	31.43±10.53

that intratympanic steroid injection is an effective treatment modality for idiopathic sudden sensorineural

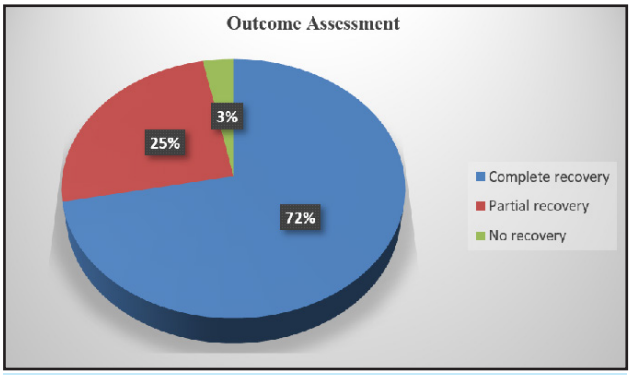

Figure 1. Outcome assessment. (n=32)

hearing loss.

DISCUSSION

Our study showed that intratympanic steroid (ITS) injection was an effective treatment modality for patients with idiopathic sudden sensorineural hearing loss (ISSNHL). A total of 32 patients were included, and significant improvement in hearing threshold was observed after intratympanic steroid therapy. The mean pre-treatment PTA was 67.82±13.25 dB, which improved to 36.03±12.51 dB post-treatment, with a mean hearing gain of 31.43±10.53 dB (p-value<0.001). This indicates a statistically and clinically significant improvement in auditory function following treatment. Improvement was seen in both male and female patients, though no statistically significant gender difference was noted.

A study by Rauch et al. (2011) compared oral and intratympanic steroids for ISSNHL and concluded that intratympanic steroid therapy produced comparable hearing recovery to systemic therapy while avoiding systemic side effects, suggesting ITS as an effective primary or salvage treatment option for patient's intolerant to systemic steroids.[3] Similarly, Battaglia et al. (2008) evaluated the use of intratympanic steroids in patients with ISSNHL and found that significant hearing improvement occurred in 40% of cases who failed to respond to systemic steroids. The study suggested that intratympanic steroids could serve as both a primary and rescue therapy.[4] Haynes et al. (2007) also demonstrated that hearing improvement rates were higher in patients receiving intratympanic steroids compared to placebo, particularly when treatment was initiated within the first two weeks of onset.[5] This finding supports the timing of treatment in our study, where post-treatment PTA was assessed within two weeks of therapy.

In a prospective study, Plontke et al. (2009) found that local intratympanic administration achieved high perilymph steroid concentrations with minimal systemic absorption, providing an anatomical rationale for its efficacy and safety in treating ISSNHL.[6] Dispenza et al. (2011) conducted a study comparing systemic, intratympanic, and combined therapy. They reported that combined therapy yielded the greatest improvement, followed by intratympanic alone, indicating that ITS plays a critical role in augmenting recovery, either alone or in conjunction with systemic steroids.[7] In another study, Xenellis et al. (2006) evaluated patients with poor response to oral steroids and found significant improvement (40%) after intratympanic salvage therapy, underscoring its value as a secondary treatment option for resistant ISSNHL.[8]

Our findings are consistent with these studies, reinforcing that intratympanic steroid therapy provides substantial hearing improvement in a significant proportion of ISSNHL patients. The direct cochlear drug delivery bypasses systemic metabolism, resulting in higher inner ear concentrations and reduced systemic side effects. However, despite the favorable outcomes, not all patients showed complete recovery. Factors such as delayed presentation, baseline severity of hearing loss, and presence of comorbidities may influence therapeutic outcomes. Future studies with larger sample sizes and longer follow-up periods are warranted to assess long-term stability of hearing recovery and relapse rates.

CONCLUSIONS

We observed significant improvement in hearing thresholds in patients with idiopathic sudden sensorineural hearing loss (ISSNHL) following intratympanic steroid injection. Based on the findings of this study, ITS appears to be an effective and safe treatment modality, particularly in patients who are unable to tolerate systemic steroids or in those who present early after onset of hearing

loss. However, our study has certain limitations. The sample size was small (n=32), and post-treatment assessment was limited to 2 weeks, which may not capture long-term hearing outcomes. Additionally, we did not evaluate the influence of comorbidities, baseline severity of hearing loss, or presence of vertigo/tinnitus on treatment response, which could be considered as limitations of this study.

Conflict of interest: None

Funding: None

REFERENCES

1. Stachler RJ, Chandrasekhar SS, Archer SM, Rosenfeld RM, Schwartz SR, Barrs DM,et al. Clinical practice guideline: sudden hearing loss. Otolaryngol Head NeckSurg. 2012 Mar;146(3 Suppl):S1–35. [DOI]
2. Chandrasekhar SS, Tsai Do BS, Schwartz SR, Bontempo LJ, Faucett EA, Finestone SA, et al. Clinical practice guideline: Sudden hearing loss (update). Otolaryngol Head Neck Surg. 2019;161(1 Suppl): S1–S45. [DOI]
3. Rauch SD, Halpin CF, Antonelli PJ, et al. Oral vs intratympanic corticosteroid therapy for idiopathic sudden sensorineural hearing loss: a randomized trial. JAMA. 2011 May 25;305(20):2071-9. [DOI]
4. Battaglia A, Burchette R, Cueva R. Combination therapy (intratympanic dexamethasone +high-doseprednisone) for idiopathic sudden sensorineural hearing loss. OtolNeurotol. 2008;29(4):453–460.[DOI]
5. Haynes DS, O'Malley M, Cohen S, Watford K, Labadie RF. Intratympanic dexamethasone for sudden sensorineural hearing loss after failure of systemic therapy. Laryngoscope. 2007;117(1):3–15. [DOI]
6. Li X, Chen WJ, Xu J, Yi HJ, Ye JY. Clinical Analysis of Intratympanic Injection of Dexamethasone for Treating Sudden Deafness. Int J Gen Med. 2021 Jun 16;14:2575-2579. [DOI]
7. Zhao D, Tong B, Wang Q, Hellstrom S, Duan M. A comparison of effects of systemic and intratympanic steroid therapies for sudden sensorineural hearing loss: A meta-analysis. J Otol. 2016 Mar;11(1):18-23. doi: 10.1016/j.joto.2016.02.002. Epub 2016 Apr 6. [PubMed]
8. Xenellis J, Papadimitriou N, Nikolopoulos T, Maragoudakis P, Segas J, Tzagaroulakis A, Ferekidis E. Intratympanic steroid treatment in idiopathic sudden sensorineural hearing loss: a control study. Otolaryngol Head Neck Surg. 2006 Jun;134(6):940-5. [PubMed]

Citation: Adhikari S, Bhandari C, Sharma B, Rijal N, Upadhyay HP, Shrestha N. Effectiveness of Intratympanic Steroid Injection in Treatment of Idiopathic Sudden Sensorineural Hearing Loss. JoBH, Nepal. 2025; 1(3): 208-211.