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Case Series

Efficacy of intratympanic steroid in the management of sudden sensorineural hearing loss: a prospective clinical study

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ABSTRACT

Sudden sensorineural hearing loss (SSNHL) is a distressing otologic emergency that requires prompt management. Systemic corticosteroids have traditionally been the mainstay of treatment; however, concerns regarding systemic side effects and contraindications have led to increasing interest in intratympanic steroid (ITS) therapy. Objectives were to evaluate the efficacy of intratympanic dexamethasone in patients with SSNHL. It was a prospective, nonrandomized multicenter clinical trial. Patients diagnosed with unilateral SSNHL received intratympanic dexamethasone injections and were evaluated using serial pure tone audiometry. Hearing outcomes were assessed by changes in pure tone average (PTA). Clinically significant hearing improvement (>10 dB PTA gain) was observed in 83% of patients. Greater hearing recovery was noted in patients treated earlier after symptom onset. Intratympanic dexamethasone is a safe and effective treatment option for SSNHL and may be considered as a primary treatment modality, particularly when initiated early.

Keywords: Sudden hearing loss, Dexamethasone, Intratympanic injection, Hearing recovery

INTRODUCTION

Sudden sensorineural hearing loss (SNHL) is a medical emergency which needs to be managed at the earliest. It is defined as 30 dB or greater shift in bone conduction thresholds in three consecutive frequencies within 72 hours or less.[1]

Although the disease is still considered idiopathic, many authors have suggested viral infections, vascular insufficiency, and immunological or inflammatory conditions, intra labyrinthine membrane rupture and drug toxicity as possible etiologies.[2,3]

Certain conditions that can cause SSNHL include otologic surgery, noise trauma, barotrauma, Meniere's disease, acoustic neuroma, syphilis, toxoplasmosis, diabetes mellitus, multiple sclerosis, sarcoidosis, Lyme's disease, mumps, HIV, polyarteritis nodosa, Cogan's syndrome, malingering and migraines.[4]

Various treatment modalities have been used in the treatment of SNHL like oral, intravenous and ITSs, hyperbaric oxygen therapy and vasodilators. In this study, we propose to analyze the efficacy of intratympanic dexamethasone at different hearing loss frequencies in the treatment of sudden SNHL.

It is mostly unilateral although bilateral involvement in up to 4% cases has been reported and it is often but not always accompanied by tinnitus and/or vertigo.[5]

The incidence increases with age, ranging from 11 per 100,000 for patients younger than 18 years to 77 per 100,000 for those older than 65 years with an overall slight male preponderance.[6]

CASE SERIES

This was a prospective study conducted in the Department of ENT, L.G. Hospital, Ahmedabad for a period of 14

months starting September 2024. Informed consent was taken from all the patients. The study was done on patients attending E.N.T. OPD and diagnosed as SSNHL.

Patients with sudden unilateral SNHL of >30 dB over at least three frequencies, onset of hearing loss within one month, with normal or near-normal hearing in the contralateral ear, age 18 years and older and patients who received two or more ITS injections and completed pre- and post-treatment audiometric evaluation were included in the study.

Patients with otologic surgery in the past, hearing loss after radiotherapy, barotrauma, head injury, fluctuating hearing loss, evidence of acute otitis media, chronic otitis media, cholesteatoma, otosclerosis or retrocochlear lesion were excluded from the study.

All patients underwent a detailed clinical evaluation, including comprehensive history taking and otorhinolaryngological examination. Laboratory investigations included complete blood count, fasting blood glucose, renal and liver function tests, thyroid function tests, erythrocyte sedimentation rate, VDRL, and rheumatoid factor when clinically indicated. Audiological assessment consisted of pure tone audiometry, tympanometry, tuning fork tests, and brainstem evoked response audiometry (BERA). Radiological evaluation with MRI and high-resolution CT of the temporal bone was performed when indicated.

ITS injections

Systemic administration of corticosteroids does not achieve perilymph concentrations comparable to those attained through intratympanic delivery. For each injection, approximately 1 ml of dexamethasone (4 mg/ml) was administered. The procedure was performed under topical anesthesia with the patient in the supine position. Using a 26½-gauge spinal needle, dexamethasone was injected via a transtympanic approach employing the Beer-can technique, targeting the posteroinferior quadrant of the tympanic membrane under microscopic guidance.

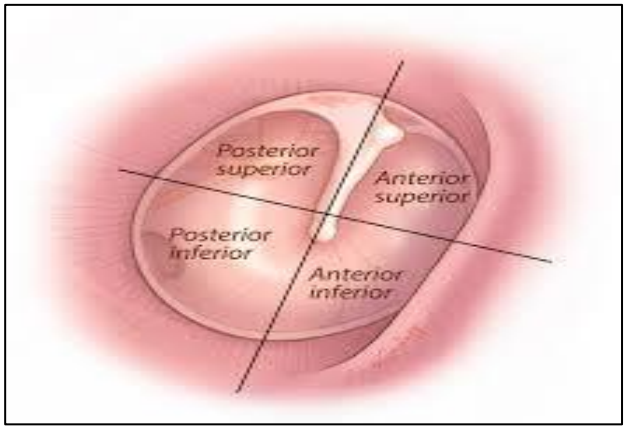


Figure 1: Tympanic membrane of right ear.

Following the injection, the patient's head was maintained in position for 30 minutes to facilitate diffusion of the drug across the round window membrane. Patients were advised to avoid swallowing during this period to minimize eustachian tube drainage of the medication. Common transient adverse effects such as dizziness, ear fullness, pain, and burning sensation were explained prior to the procedure. Each patient received a minimum of two intratympanic injections, with treatment endpoints determined based on audiometric response.

Demographic data including age, sex, comorbidities, prior or concomitant systemic steroid use, number of intratympanic injections, and duration between symptom onset and initiation of ITS therapy were recorded. Audiograms were obtained at baseline, one month after completion of therapy, and at three months in patients with no initial response.

Treatment response was defined as a change in PTA, calculated using thresholds at 0.5, 1, and 2 kHz. The difference between pre-treatment PTA and post-treatment PTA at one month was used to assess hearing improvement. Supportive medications such as antivertigo agents and multivitamins were prescribed as required.

During the study period, 12 patients studied, the mean age was 31.4±7.25 years. The youngest patient was just over 18 and the oldest 45 years. Half of the patients were in their 3rd decade of life, while 25% of patients were in the 21-30 age group. There was a 3:1 male to female ratio. The hearing loss was profound in 5 (41.6%), severe in 4 (33.3%), moderately severe in 2 (16.6%), moderate in 1 (8.3%) patient.

Comparison of recovery rates in SSNHL treated with intratympanic steroids.

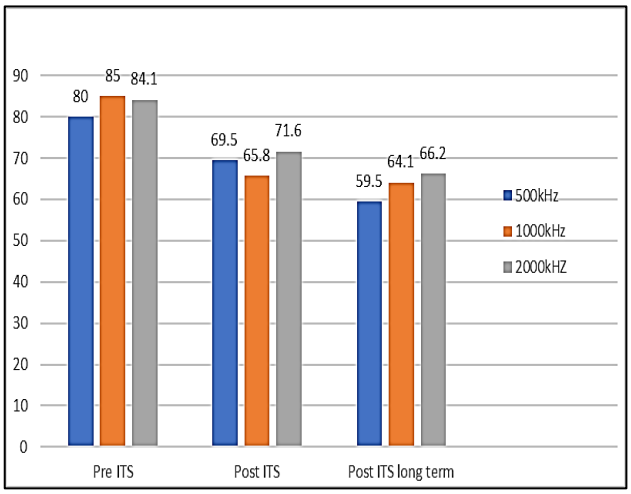


Figure 2: Intratympanic steroid.

Table 1 describes clinical outcomes after treatment. Average hearing loss in all 12 patients was 83.0±15.3 dB at presentation and 63.43±15.46 dB after treatment, with

improvement in hearing of 19.57±10.8 dB; a hearing gain of >10 dB being seen in 10 (83%) patients. Comparison of recovery rates in SSNHL treated with ITS.

Comparison of the hearing gain in the pure-tone average among the four groups according to degree of hearing loss.

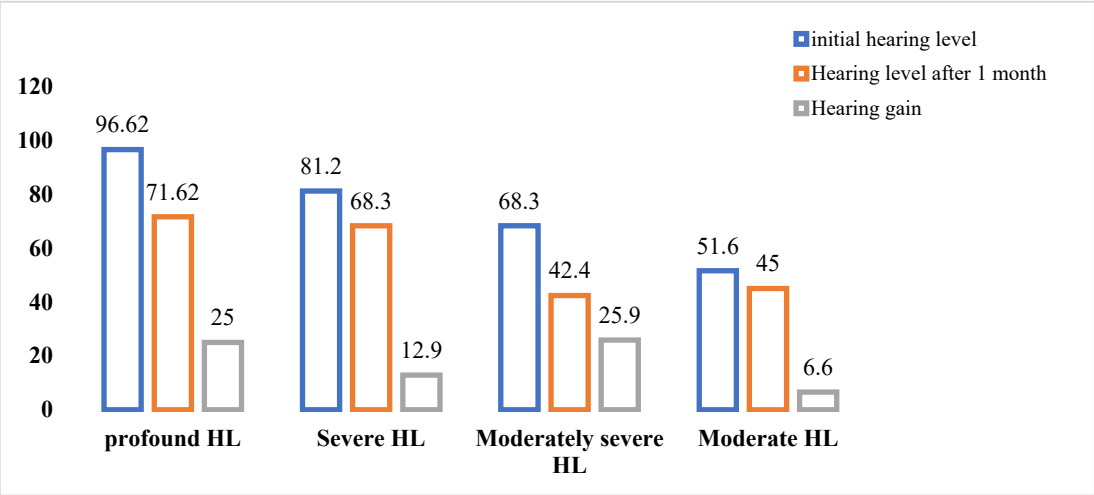


Figure 3: Clinical outcomes after treatment.

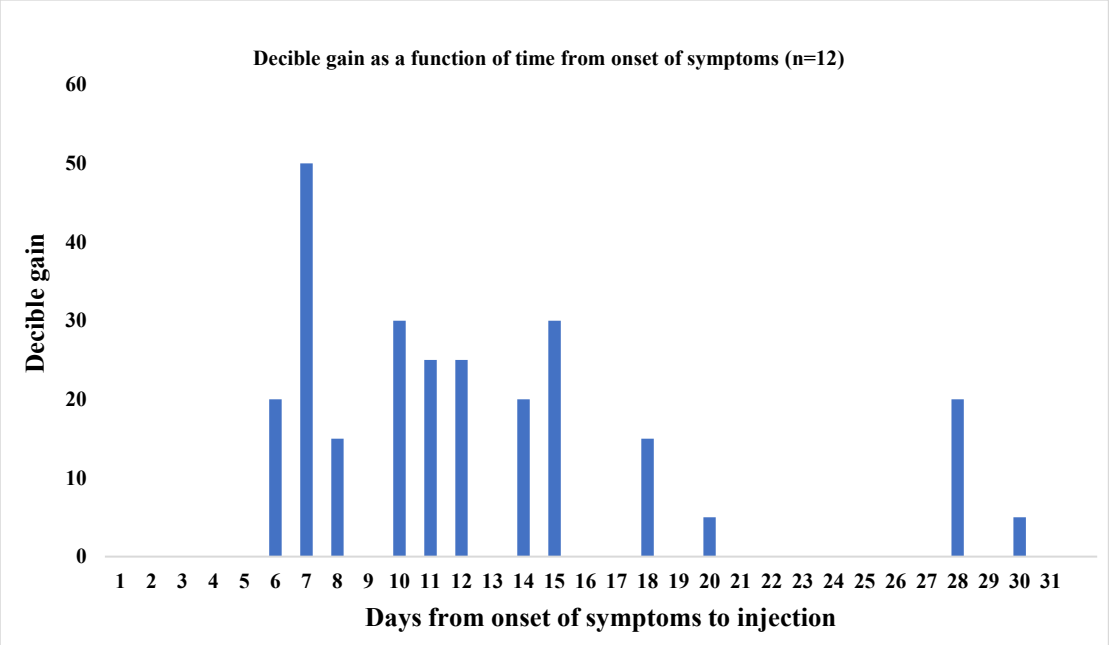


Figure 4: Decibel gain as a function of time from onset of symptoms (n=12).

Table 1: Clinical outcomes after treatment.

Authors with applied criteria	Percent improved	Criteria for improvement
Silverstein et al[9]	25	>10-dB PTA
Kopke et al[10]	83	>10-dB PTA
Lefebre and Staeker et al[11]	100	>10-dB PTA
Current study	83	>10-dB PTA

Figure 3 describes clinical outcomes after treatment. The mean hearing gains were 25 dB in the profound HL group, 12.9 dB in the severe HL group, and 25.9 dB in the moderately severe HL group and 6.6 dB in moderate HL group. There was no significant difference in hearing gain among the four groups ($p>0.05$).

Figure 4 suggests that cases treated earlier (within 7-10 days) show higher decibel gains (better hearing recovery). Those treated later (>15-20 days) show much lower gains, some almost none. There appears to be inverse relationship between the delay in treatment and the improvement in hearing.

DISCUSSION

The present study demonstrated a significant hearing improvement following intratympanic steroid therapy in patients with SSNHL, with 83% of patients showing a hearing gain >10 dB, which is comparable to outcomes reported in earlier studies.

Silverstein et al were among the first to report the use of intratympanic steroids in SSNHL and observed hearing improvement in 25% of patients, using a criterion of >10 dB improvement in PTA.[9] The lower recovery rate in their study compared to the present study may be attributed to differences in patient selection, severity of hearing loss, timing of treatment initiation, and steroid delivery protocols.

Kopke et al reported a substantially higher recovery rate of 83%, similar to the findings of the present study.[10] Their results support the efficacy of intratympanic steroid therapy, particularly when used early and in patients who are refractory to systemic steroid treatment. This similarity reinforces the reliability of intratympanic steroids as an effective treatment modality for SSNHL.

Lefebvre and Staecker reported hearing improvement in 100% of patients, using a stricter criterion of >16 dB improvement in PTA.[11] Although their reported recovery rate was higher than that observed in the current study, the smaller sample size and differences in outcome definitions may explain this variation.

In the present study, mean hearing improvement was 19.57±10.8 dB, which aligns well with the improvements reported in previous literature. Additionally, subgroup analysis revealed that patients treated earlier (within 7-10 days of symptom onset) achieved greater hearing gains, corroborating earlier reports that emphasize the importance of early intervention. Similar inverse relationships between treatment delay and hearing recovery have been documented by several authors.

Regarding severity-based outcomes, patients with moderately severe and profound hearing loss in the current study showed meaningful improvement, although no statistically significant difference in hearing gain was observed across different severity groups ($p>0.05$). This finding is consistent with earlier studies suggesting that intratympanic steroids may be beneficial across a wide spectrum of hearing loss severity.

Overall, the findings of the present study are consistent with existing literature and further support the role of intratympanic steroid therapy as an effective and safe treatment option for SSNHL, particularly in patients presenting early or in whom systemic steroids are contraindicated.

CONCLUSION

Although systemic corticosteroids remain the conventional treatment for sudden sensorineural hearing loss, their use may be limited by systemic side effects and contraindications. Intratympanic dexamethasone was found to be a safe and effective alternative in the present study, with favorable hearing outcomes, particularly when treatment was initiated early. Intratympanic steroid therapy may therefore be considered a viable primary treatment option for SSNHL. Larger studies are warranted to confirm these results.

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Ethical approval: Not required

REFERENCES

1. Wilson WR, Byl FM, Laird N. The efficacy of steroids in the treatment of idiopathic sudden hearing loss. A double-blind clinical study. Arch Otolaryngol. 1980;106(12):772-6.
2. Plaza G, Herráiz C. Intratympanic steroids for treatment of sudden hearing loss after failure of intravenous therapy. Otolaryngol Head Neck Surg. 2007;137(1):74-8.
3. Banerjee A, Parnes LS. Intratympanic corticosteroids for sudden idiopathic sensorineural hearing loss. Otol Neurotol. 2005;26:878-81.
4. Kuhn M, Heman-Ackah SE, Shaikh JA, Roehm PC. Sudden sensorineural hearing loss: a review of diagnosis, treat ment and prognosis. Trends Amplif. 2011;15:91-105.
5. Chandershekhar SS, Tsai Do BS, Schwartz SR. Clinical practice guidelines: sudden hearing loss (update). Oto laryngol Head Neck Surg. 2019;161:195-210.
6. Chandershekhar SS. Intratympanic dexamethasone for sudden sensorineural hearing loss: clinical and labortary evaluation. Otoneurology. 2001;22(1):18-23.
7. Chandrasekhar SS, Rubinstein RY, Kwartler JA, Gatz M, Con nelly PE, Huang E, et al. Dexamethasone pharmacokinetics in the inner ear: comparison of route of administration and use of facilitating agents. Otolaryngol Head Neck Surg. 2003;122(4):521-8.
8. Bachmann G, Su J, Zumegen C, Wittekindt C, Michel O. Permeabilitat derrunden Fenster membrane fur Prednisolon-21 Hydrogensuccinat. Prednisolongehalt der Perilymphe nach loka ler Applikation vs. system ischer injektion. HNO. 2001;49(7):538-42.
9. Silverstein H, Choo D, Rosenberg SI, Kuhn J, Seidman M, Stein I. Intratympanic steroid treatment of inner ear dis ease and tinnitus (preliminary report). Ear Nose Throat J. 1996;75:468-71.
10. Kopke RD, Hoffer ME, Wester D, O'Leary MJ, Jackson RL. Targeted topical steroid therapy in sudden sensorineural hearing loss. Otol Neurotol. 2001;22:475-9.

11. Lefebvre PP, Staecker H. Steroid perfusion of the inner ear for sudden sensorineural hearing loss after failure of con ventional therapy: a pilot study. Acta Otolaryngol. 2002;122:698-702.

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