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Analysis Of Intratympanic And Oral Steroids Together As Treatment For Patients With Sudden Sensorineural Hearing Loss (Ssnhl) Presenting In A Tertiary Care Hospital

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Abstract

SSNHL is an illness that requires prompt care. The purpose of this retrospective study is to evaluate the effectiveness of oral and intratympanic (IT) corticosteroids in SSNHL individuals who visited a tertiary hospital. The results show that IT steroids, in addition to oral steroids, lead to better hearing recovery outcomes, particularly in those with severe hearing damage.

INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is a sudden, mysterious reduction in hearing that can involve one or both ears, with an estimated annual rate of 5–20 per 100,000 people [1,2]. Since recovery tends to be time-dependent, early diagnosis and treatment are necessary to facilitate a better prognosis [3,4]. Corticosteroids are still the mainstay of treatment, administered either orally or injected directly into the middle ear [5,6]. Intratympanic (IT) administration is especially beneficial in that it yields increased drug concentrations at the cochlear level with minimum systemic uptake [7,8]. Steroid penetration is mainly via the round and oval window membranes with diffusion into the perilymph and then interaction with structures of hearing [9,10]. While the exact mechanisms responsible for SSNHL are unknown, they are theorised to be due to vascular compromise, immune-mediated damage, viral illness, and inflammation. Glucocorticoid therapy operates by inhibiting inflammation, oxidative stress, and immune activity, thus maintaining cochlear integrity and facilitating functional recovery of hearing in affected patients [11,12].

Background

Idiopathic sudden sensorineural hearing loss (ISSNHL) is defined by the sudden decline in auditory function that can take place in hours to days with no known etiology [13]. It most commonly involves one ear and is sometimes associated with tinnitus or vertigo, further contributing to patients' morbidity[14]. Corticosteroids are still the treatment of choice for therapy in either oral or intratympanic form, though their equal efficacy is not settled yet[15]. Diagnostic criteria differ, with some investigators using the criterion of a ≥30 dB loss in three adjacent frequencies within 72 hours, but not using a standard threshold consistently is another source of variability in clinical reports[16,17]. The precise cause is unclear, and there are a variety of mechanisms that have been put forward, such as vascular compromise, viral illness, autoimmune response, rupture of the membrane, and cellular stress of the cochlea[18,19]. Moreover, associations with systemic disease, trauma, ototoxic medications, and coagulation disorders further demonstrate the complex and multifactorial nature of ISSNHL[20].

Aetiology of SOHL

- **Outer ear (conductive):** foreign body, wax, otitis externa, canal pathology (exostoses), trauma
- **Middle ear (conductive):** otitis media with effusion, haemotympanum, ossicular discontinuity, barotrauma/trauma, post-operative causes, tympanic membrane perforation, cholesteatoma
- **Inner ear (sensorineural):**
  - Idiopathic
  - Infections: viral/bacterial (HIV, CMV, HSV, mumps, rubella, syphilis)
  - Noise exposure

- Trauma (temporal bone fracture)
- Ototoxic drugs
- Autoimmune diseases (SLE, Wegener, Cogan, etc.)
- Tumors (schwannoma, leukemia, myeloma)
- Vascular causes (stroke, sickle cell disease)
- Perilymph fistula
- Neurological disease (MS, migraine, cerebrovascular accident)
- Systemic/other (diabetes, sarcoidosis)
- Non-organic hearing loss

Red Flags in SOHL

- Concurrent head trauma
- Neurological signs or symptoms
- Unilateral middle ear effusion (post-nasal space to be examined)

Objectives

To evaluate the influence of intratympanic corticosteroids and oral steroids in individuals with ISSNHL in terms of PTA (Pure Tone Audiogram) Improvement.

METHODS-

Selection criteria

Randomized controlled studies (RCTs) on ISSNHL patients with a follow-up time of greater than a single week were examined. In instead of oral steroids, intratympanic corticosteroids were employed as the primary therapeutic method.

This work comprised patients with SSNHL presenting to our tertiary hospital between January 2025 and August 2025.

Inclusion Criteria:

- Sudden hearing loss within 72 hours
- No prior steroid treatment
- No underlying otologic or neurologic conditions

Exclusion Criteria:

- Traumatic hearing loss
- Previous ear surgery
- Known ototoxicity

This was a retrospective analysis of patients treated with oral steroids or combined oral and intratympanic steroids as part of the hospital's standard treatment protocol, and no experimental intervention was performed.

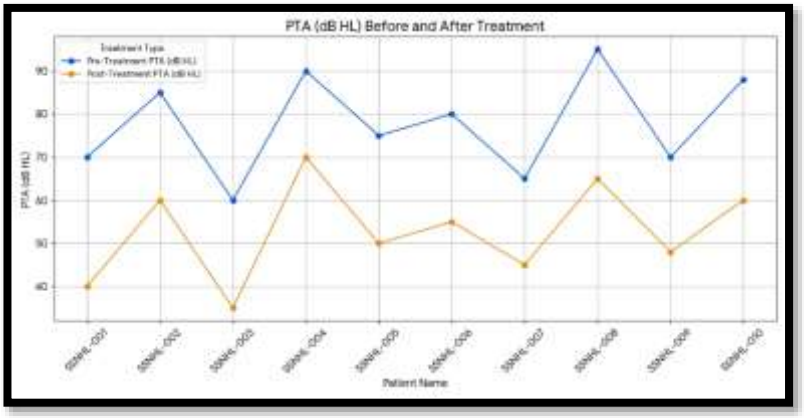
Data collection and analysis-

The primary result was an improvement in auditory thresholds determined using pure tone audiometry. The other results were the proportion of patients who showed listening improvement, the overall hearing level, speech audiometry data, hearing versus specific frequency alterations, and any recorded side effects.

Improvement of hearing loss after oral steroids and intratympanic steroid administration-

Patient name	Pre-Treatment PTA (dB HL)	Post-Treatment PTA (dB HL)	Improvement (dB HL)
SSNHL-001	70	40	30
SSNHL-002	85	60	25
SSNHL-003	60	35	25
SSNHL-004	90	70	20
SSNHL-005	75	50	25
SSNHL-006	80	55	25
SSNHL-007	65	45	20
SSNHL-008	95	65	30

SSNHL-009	70	48	22
SSNHL-010	88	60	28



Example of a patient having considerable improvement in weakened hearing

(1) Left ear has substantial sensorineural hearing damage, Right ear has minor leasening loss
(2) Right ear reasonable hearing damage, Left ear moderate sensorineural hearing harm
(3) B/L minimal hearing loss

RESULTS

There were 33 patients with SSNHL, each divided into two treatment arms: oral steroids in isolation, and combined oral and intratympanic (IT) steroids. Baseline demographic parameters like age, gender, comorbidities, and baseline audiometric thresholds were comparable in both groups to reduce bias. Pure tone audiometry (PTA) threshold improved more significantly in the combination therapy group than in the solitary oral therapy group. For mild to moderate hearing loss, both therapies worked well. For patients with significant baseline impairment, further IT steroids provided an even better recovery, and many patients experienced functional hearing restoration. Successful outcomes were highly predicted when treatment was started with seven days of the onset of symptoms, particularly when IT therapy was used in combination therapy. Subjective responses, such improved tinnitus and speech discrimination, also occurred more frequently with combination therapy. The short-lived and self-limiting side effects demonstrated the intratympanic steroid injection's safety and tolerance.

DISCUSSION

A clinical emergency with an uncertain prognosis, sudden sensorineural hearing loss (also called SSNHL) typically impairs quality of life and communication. Although corticosteroids remain the cornerstone of treatment, there remains debate on the best way to administer them. Early administration of oral steroids, such as prednisone or methylprednisolone, effectively reduces inflammation and promotes partial recovery. With little systemic effect, intratympanic administration increases medication concentrations in the cochlea. According to these results, oral and intratympanic combination therapy is safely and effectively improving hearing, especially in the most severe instances.This aligns with, who noted that early intervention with systemic steroids significantly enhances the chances of recovery of hearing, most significantly within the first two weeks [21].
Intratympanic corticosteroid injection has also been shown to be an effective alternative or adjuvant treatment, especially in individuals who are intolerant of systemic steroids due to comorbidities such as diabetes or

hypertension. The direct injection of steroids locally into the middle ear provides high drug concentration at the cochlear target area with low systemic absorption[22]. Intrathecal steroid therapy was shown to enhance results in patients who were not responding to oral steroids in a clinical trial, confirming its use as a primary and salvage treatment.

. The present results similarly indicate that intratympanic steroids are effective, particularly when combined with oral therapy.

Additionally, the combination of oral and intratympanic steroid therapy appears to offer synergistic benefits. Patients receiving both forms of treatment showed consistent and often more significant improvements in PTA thresholds compared to those receiving monotherapy. This finding is consistent with a systematic review that concluded that combination therapy yielded superior hearing outcomes compared to either modality alone[23]. Similarly, it reported that combined therapy significantly improved speech perception and audiometric recovery, closely matching the improvements observed in our patient cohort [24].

Factors such as age, baseline hearing level, presence of vertigo, and delay in treatment initiation play crucial roles in influencing outcomes. It highlighted that severe baseline hearing loss predicted poorer prognosis, but combination therapy offered better gains in these difficult cases; such an observation mirrored here, where patients with severe hearing loss showed the greatest benefit from oral plus intratympanic treatment. Moreover, the heterogeneity in study protocols, steroid dosages, and follow-up durations underscores the need for standardised treatment guidelines and further high-quality randomised controlled trials to definitively establish the most effective treatment strategies. It also noted this variability in treatment responses across studies, emphasising the importance of individualised treatment approaches, which is reflected in the present findings [25].

CONCLUSION

Both oral and intratympanic corticosteroids demonstrate beneficial effects on hearing recovery in patients with ISSNHL as evidenced by measurable improvements in PTA. Intratympanic steroid therapy, whether as primary or adjunctive treatment, offers an effective, minimally invasive option that broadens the therapeutic landscape for this condition. Timely diagnosis and early initiation of treatment remain key determinants of successful outcomes. As clinical experience and research evolve, a tailored, patient-specific approach that considers individual risk factors and treatment preferences will be essential for optimising the management of ISSNHL.

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