

# Role of Intratympanic Steroids in the Management of Idiopathic Sudden Sensori-Neural Hearing Loss.

Smruti Swain<sup>1</sup><sup>1</sup>Associate Prof ENT, SCB Medical College, Cuttack, Odisha.

Received: November 2017

Accepted: November 2017

**Copyright:** © the author(s), publisher. Annals of International Medical and Dental Research (AIMDR) is an Official Publication of "Society for Health Care & Research Development". It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** To assess the outcomes of intratympanic steroids in the management of idiopathic sudden sensori-neural hearing loss. Study Design: Retrospective study. Setting: tertiary care medical centre. **Methods:** A total of 56 patients with idiopathic sudden sensorineural hearing loss were included in our study. They received 4 doses of 0.3- 0.5ml (40 mg/mL) of methylprednisolone injected into the middle ear with a gap of four days in between the doses. Pre- and post-injection hearing evaluation was done to determine overall success, morbidity, and prognostic factors. Patient variables as they related to recovery were studied and included patient's age, time to onset of therapy, severity of hearing loss, and presence of associated symptoms. **Results:** A total of 56 patients were included in our study of which unilateral cases were 52 and bilateral cases were 4. Subjectively 38 patients reported improvement in hearing after the therapy while objectively we found 44 ears (74%), 41 patients had improvement. The mean PTA pre ITS (intratympanic steroid) was 58.7 dB and after ITS it was 30.3dB. Thus mean PTA improved by 28.4 dB. **Conclusion:** Intratympanic steroids can be offered as a first line therapy for idiopathic sudden sensorineural hearing loss as it is minimally invasive, and can be performed as an office based procedure with no systemic side effects. No major complications have been reported in our study and results have been satisfactory.

**Keywords:** Intratympanic Methyl Prednisolone, Sudden Sensorineural Hearing Loss, Idiopathic Sudden Sensorineural Hearing Loss.

## INTRODUCTION

Idiopathic Sudden Sensorineural Hearing Loss [ISSHL] is defined as 30 db or greater hearing loss in three consecutive frequencies occurring within 72 hours or less.<sup>[1]</sup> The term idiopathic should be applied only after ruling out other causes of sudden hearing loss like noise, trauma, infection, neoplasia, toxic, neurologic and metabolic causes.<sup>[2]</sup> Most of the cases are spontaneous with no attributable risk factor. The pathophysiology is not fully understood with various causes being implicated in the disease causation like viral infection, immunologic diseases, intralabyrinthine membrane leaks, vascular occlusion with disturbances in the microcirculation.<sup>[3]</sup>

Silverstein first reported the use of intratympanic steroids in the management of sudden hearing loss and since then intratympanic steroids have gained popularity in the management of various disorders affecting the inner ear.<sup>[4]</sup>

There are various protocols in the management of ISSHL like antiviral, systemic corticosteroids, anti inflammatory, vasodilators and anticoagulants but there is no universally accepted protocol for the management. Many studies have shown efficacy of systemic steroids but the adverse effects of it are well known. Hence to avoid the adverse effects and to have concentration of steroids in the inner ear intratympanic steroids are becoming the latest trend in the management of ISSHL.

### Aim

To assess the outcomes of intratympanic methyl prednisolone injections in management of ISSHL.

## MATERIALS AND METHODS

This study was conducted in the department of ENT and Head and neck surgery SCB medical college Cuttack. It was conducted from January 2016 to June 2017.

A total of 56 patients were included in the study and received intratympanic Methyl prednisolone. Detailed history was taken from the patients regarding onset of hearing loss, duration of hearing loss, if there was any pre existing ear pathology or any prior viral infection.

### Name & Address of Corresponding Author

Dr. Smruti Swain  
Associate Professor  
Department ENT,  
SCB Medical College  
Cuttack, Odisha.

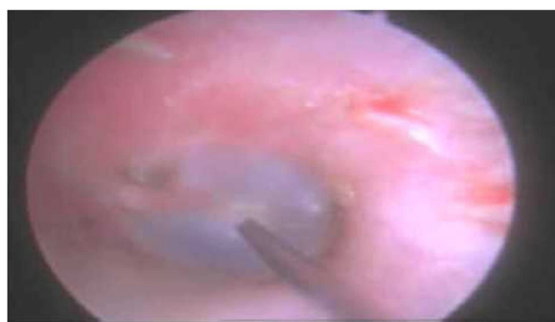
Hearing change was evaluated by comparing pre-treatment and post-treatment pure-tone average (PTA) (500, 1K, and 2K Hz), and categorized into complete, partial, and no recovery of hearing. The hearing improvement was evaluated based on the change in hearing threshold from the pre-treatment to the 2-month follow-up audiogram. The hearing in unaffected normal ear as measured at the time of diagnosis was used as standard or reference hearing level. Pure-tone average (PTA) was calculated using the three-frequency average (i.e., 500, 1000 and 2000 Hz). In addition, we adapted Wilson's criteria to categorize hearing recovery into:<sup>[5]</sup> i) complete recovery: a post-treatment PTA that was  $\geq 90\%$  of the reference hearing level; ii) partial recovery: 50% to 89% improvement of the PTA but with a remaining hearing loss of  $> 10$  dB relative to the reference hearing level; and iii) no recovery:  $< 50\%$  improvement of PTA relative to the reference hearing level. Pain score following injection was assessed with visual analogue scale.<sup>[6]</sup>

#### Inclusion Criteria

- 1) Sudden onset of hearing loss with less than 72 hours durations with loss of more than 30 db in three consecutive frequencies.
- 2) Normal MRI Brain with gadolinium contrast.

#### Exclusion Criteria

- 1) Patients with age less than 10 years.
- 2) Patients presenting with vertigo along with hearing loss.
- 3) History or evidence of acute or chronic otitis media.
- 4) History of ear surgeries.
- 5) Patients with history of trauma to the ear.
- 6) Noise induced hearing loss.
- 7) Patients presenting after 8 weeks of hearing loss.



**Figure 1: Intratympanic injection under operating microscope**

#### Procedure

The procedure was performed as an Outpatient basis. Patients consent was taken before starting the procedure. The ear was anaesthetised by instilling 4% lignocaine drops in the ear for ten minutes. All patients received four doses of 0.3-0.5ml (40 mg/mL) of methylprednisolone injected into the middle ear under operating microscope in the antero-

superior quadrant of tympanic membrane with a gap of four days in between the doses .

After seven days of completion of the treatment, repeat audiometric testing was done. Patients were followed up for a period of 6 months.

## RESULTS

A total of 56 patients were included in our study of which unilateral cases were 52 and bilateral were 4 cases. A total of 60 ears received intratympanic methyl prednisolone. Males were 36 and females were 20 with M: F ratio of 1.8:1.

Right ear was affected in 36 and left in 24. The mean age was 44 years with the youngest patient being 13 years and the oldest patient being 65 years.

#### Improvement in Hearing

Improvement in hearing was assessed subjectively and objectively. Subjectively 38 patients reported improvement in hearing after the therapy while objectively we found 41 patients (73%), 44 ears had improvement. The Mean PTA before ITS was 58.7 while Post ITS, PTA was 30.3dB. Thus mean PTA improved by 28.4 dB. Out of 41 patients who had improvement, Complete Improvement was seen in 16 (28.5%) and Partial improvement was seen in 25 (44.5%) patients. No improvement was seen in 15(27%) patients. The hearing reached the baseline after 1 month of completion of treatment.

**Table 1: Showing hearing improvement assessed after 1 month post therapy**

Hearing improvement	No of patients	Percentage
Complete	16	28.5%
Partial	25	45.5%
No improvement	15	27%
Total	56	100%

#### Correlation of Hearing Improvement with Duration of Onset of treatment

We tried to correlate improvement of hearing with respect to duration of onset of treatment. Duration of onset of treatment ranged from 1 day to 36 days with a mean of 10.8 days. We found the patients who had complete improvement of hearing presented within 10 days of onset of disease, mean duration for onset of treatment was 6.8 days. Patients with partial improvement mostly presented within 10 to 30 days, the mean duration of onset of treatment was 18.4.

Duration of onset of treatment	Hearing improvement		
	Partial	Complete	No recovery
1-10 days	8	10	1
11-30 days	13	4	5
>30 days	4	2	9
Total no of patient	25	16	15

#### Correlation with Age

## Swain; Intratympanic Steroids in the Sensori-Neural Hearing Loss

We categorized the patients into 3 groups according to their age and assessed the improvement in hearing. 6 cases were below the age group of 20 years among them in 4 patients had complete recovery and two had partial recovery. Forty one patients were in the age group of 21 - 50 of which improvement in hearing was seen in 28 cases and no change in 13 cases and 9 cases were above the age group of 50 years. In these group 7cases had improvement in hearing while hearing worsened in 1 patient. [Table 2]

**Table 2: Relation of improvement of hearing with respect to age.**

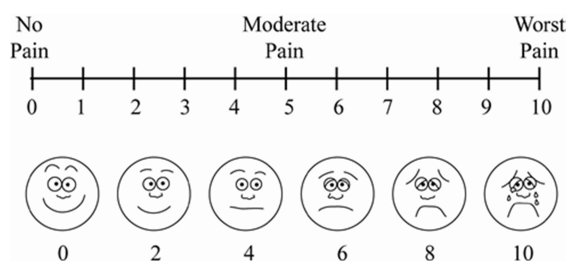
Age of patients	No. of pts	Recovery complete	partial	No improvement
Below 20 yrs	6	4	2	0
20-50yrs	41	10	18	13
>50 yrs	9	2	5	2

### Improvement in tinnitus

34 patients complained of tinnitus before therapy and in 10 patients it persisted even after treatment with improvement in 24 (70%) patients.

### Pain score

Following injection the average pain score assessed with visual analogue scale and was below 2. We anaesthetised the ear by instilling 4% lignocaine drops in the ear for ten minutes prior to injection.



**Figure 2: Visual analogue scale**

## DISCUSSION

Our study included 56 patients and 60 ears. In our study 7% [4 out 56] of the patients had bilateral pathology while another study by Huy PT, Sauvaget E reported the incidence of bilateral pathology to be less than 2% in their study.<sup>[7]</sup> 0.3-0.5 ml of 40 mg/ml methylprednisolone solution was used in our patients. iPiñones JS, , et al. used the same dosage of methylprednisolone in their study.<sup>[8]</sup> A mixture of 0.3 ml of injection methyl prednisolone [125 mg/ml] and 0.1 ml of 2% xylocaine was injected into the middle ear in their study by Deenadayal, D.S., et al.<sup>[9]</sup> Subjective improvement in hearing was reported in 68% [38/56] of the patients while objective improvement was found in 73% [41/56] of the

patients. while in a study done by Raymundo et al reported improvement by 71.4% overall improvement which matches our study.<sup>[10]</sup> The Mean PTA before ITS was 58.7 while Post ITS, PTA was 30.3dB. Thus mean PTA improved by 28.4 dB. In a study by Dallan, Iacopo; De Vito, Andrea et al the mean pure-tone average before intratympanic treatment was 79.9; after local steroid administration, the mean pure-tone average was 60.6 dB.<sup>[11]</sup> Complete recovery was seen in 16 (28.5%) and Partial recovery was seen in 25 (44.5%) patients. No improvement was seen in 15(27%) patients.

In a study byPurushothaman Ganesan, Purushothaman Pavanjur, Out of 122 patients, 58% showed complete recovery, 28% had partial recovery, whereas 14% had no recovery.<sup>[12]</sup>

We tried to correlate the maximum gain in hearing with the duration of onset of treatment. Duration of onset of treatment ranged from 1 day to 36 days with a mean of 10.8 days. We found the patients who had complete improvement of hearing presented within 10 days of onset of disease , mean duration for onset of treatment was 5.8 days. Patients with partial improvement presented with in 10 to 30 days. the mean duration of onset of treatment was 18.4 days.

A study done by Haynes DS reported no benefit of intratympanic steroid injections in patients beyond 36 days of onset of ISSNHL.<sup>[13]</sup>

None of the patients reported any major complications. Only transient nausea, vertigo and pain were reported by the patients.

## CONCLUSION

Sudden sensorineural hearing loss is a true otological emergency which requires to be managed effectively. Intratympanic steroids have minimal morbidity and the potential to have a positive effect on hearing recovery in patients with of Idiopathic Sudden Sensori- Neural Hearing Loss. They can be offered as a first line therapy for sudden sensorineural hearing loss as it is minimally invasive and can be performed as an office based procedure with no systemic side effects. No major complications have been reported in our study and results have been satisfactory.

## REFERENCES

1. Byl FM Jr. Sudden hearing loss: eight years' experience and suggested prognostic table. *Laryngoscope* 1984; 94:647-61.
2. Goravalingappa, R. and Bhattacharyya, A.K. (1997) Sudden Sensorineural Hearing Loss: An Update. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 49, 87-91
3. Anderson, R.G. and Meyerhoff, W.L. (1983) Sudden Sensorineural Hearing Loss. *Otolaryngologic Clinics of North America*, 16, 189-195.
4. Raymundo, I.T., Bahmad, F., Barros Filho, J., Pinheiro, T.G., Maia, N.A. and Oliveira, C.A. (2015) Intratympanic Methylprednisolone as Rescue Therapy in Sudden

*Swain; Intratympanic Steroids in the Sensori-Neural Hearing Loss*

- Sensorineural Hearing Loss. Brazilian Journal of Otorhinolaryngology, 76, 499-509
5. 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.
  6. Breivik, H., Borchgrevink, P.C., Allen, S.M., et al. (2008) Assessment of Pain. British Journal of Anaesthesia, 101, 17-24.
  7. Huy PT, Sauvaget E. Otol Neurotol. 2005 Sep; 26(5):896-902
  8. Piñones JS, Villarreal I, Chillerón RG, Trinidad, Camacho RR, et al. (2015) Intratympanic Methylprednisolone for Sudden Sensorineural Hearing Loss: Comprehensive Re Examination of the Model. J Otolaryngol ENT Res 3(2): 00060. DOI: 10.15406/joentr.2015.03.00060
  9. Deenadayal, D.S., et al. (2016) Role of Intratympanic Steroids in the Management of Idiopathic Sudden Sensori Neural Hearing Loss—Our Experience of 67 Cases. International Journal of Otolaryngology and Head & Neck Surgery, 5, 174-180
  10. Raymund.2015.03.00060o IT, Fayez Bahmad Jr, et al. (2010) Intratympanic methylprednisolone as rescue therapy in sudden sensorineural hearing loss, Braz. j. otorhinolaryngol. (Impr.) vol.76 no.4
  11. Dallan, Iacopo\*; De Vito, Andrea†; et al, Otolology & Neurotology: January 2010 - Volume 31 - Issue 1 - pp 25-30
  12. Ganesan P, n Pavanjur P, et al Kothandaraman, 2 A Retrospective Study of the Clinical Characteristics and Post-treatment Hearing Outcome in Idiopathic Sudden Sensorineural Hearing Loss, Audiol Resv.7(1); 2017 Feb 1
  13. Haynes et al.: Intratympanic Dexamethasone for Sudden SNHL Laryngoscope 117: January 2007

**How to cite this article:** Swain S. Role of Intratympanic Steroids in the Management of Idiopathic Sudden Sensori-Neural Hearing Loss. Ann. Int. Med. Den. Res. 2018; 4(1):EN04-EN07.

**Source of Support:** Nil, **Conflict of Interest:** None declared