

Efficacy of intratympanic steroid in the management of idiopathic sudden sensorineural hearing loss

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Abstract

Introduction: 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. The aim of the study is to assess the outcomes of intratympanic methylprednisolone injections in management of ISSHL.

Methods: A total of 50 patients were included in the study and receiving intratympanic steroids. Detailed history was taken from the patients regarding onset of hearing loss, duration of hearing loss, if there was any preexisting ear pathology

Results: A total of 50 patients were included in the study of which unilateral cases were 45 and bilateral were 5 cases. A total of 55 ears received intratympanic steroids. Males were 32 and females were 18 with M:F ratio of 1.7:1. Right ear was affected in 35 and left in 20. The mean age was 44 years with the youngest

patient being 13 years and the oldest patient being 68 years

Conclusion: Intratympanic steroids 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

Keywords: Intra tympanic steroid, Pure tone Audiometry, Sudden Sensorineural Hearing Loss, Methylprednisolone

Introduction

Idiopathic Sudden Sensorineural Hearing Loss [ISSHL] is an otologic emergency that requires quick and prompt management. ISSHL is defined as 30 db or greater hearing loss in three consecutive frequencies occurring within 72 hours or less¹. 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 causes². ISSHL accounts for 1% of the cases of sensorineural hearing loss³. Although the exact cause of ISSNHL is still controversial, the main theories include viral

infection of the labyrinth, vascular insult, perilymphatic fistula, and autoimmunity intralabyrinthine membrane leaks, vascular occlusion with disturbances in the microcirculation⁴. Spontaneous recovery in untreated patients ranges from 32% to 65%⁵. Most of the cases are spontaneous with no attributable risk factor.

The first reports of SSHL were reported about 60 years but there are no conclusive guidelines with respect to management of the disease. Silverstein first reported the use of intratympanic steroids in the management of sudden hearing loss⁶ and since then intratympanic steroids have gained popularity in the management of various disorders affecting the inner ear. Itoh first reported using intratympanic corticosteroids for the treatment of inner ear disease in patients with Ménière's disease in 1991.

The lack of consensus in the management of ISSNHL is due to difficulty in finding the real etiology of the hearing loss. Numerous treatment protocols have been reported for many years, including steroids, vasodilators, antiviral agents, anticoagulants, hyperbaric oxygen, and carbogen.^{7,8,9} 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 ISSNHL.

Materials and Methods

The aim of the study is to assess the outcomes of intratympanic methyl prednisolone injections in management of ISSNHL. This study was conducted in the department of Otorhinolaryngology in a tertiary referral Hospital Assam. It was conducted from JULY 2017 to AUGUST 2018. A total of 50 patients were included in the study and receiving intratympanic steroids. Detailed history was taken from the patients regarding onset of

hearing loss, duration of hearing loss, if there was any preexisting ear pathology or any prior viral infection. Hearing loss was documented with audiometric testing.

Statistical Analysis: The statistical analysis of data was performed using the computer program, Statistical Package for Social Sciences (SPSS for Windows, version 20.0. Chicago, SPSS Inc.) and Microsoft Excel 2010. Results on continuous measurements are presented as mean \pm standard deviation are compared using student t test. Discrete data are expressed as number (%) and are analysed using Chi square test and Fischer's exact test (where the cell counts were <5 or 0). Pearson's correlation coefficient (r) was used to measure the associations among continuous variables. For all analyses, the statistical significance was fixed at 5% level (p value <0.05).

Ethical Clearance: Before commencing the study, necessary permission and approval from ethics committee was obtained from the Institutional Ethics Committee (Human), Assam Medical College and Hospital. Informed written consents were obtained from all the patients involved in the study according to the protocol approved by the Ethics Committee and after explaining the procedure to them in their own understandable language. All the procedure were done by same surgical team.

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.

Exclusion Criteria

- 1) Patients with age less than 10 years. History or evidence of acute or chronic otitis media.
- 2) History of ear surgeries.
- 3) Patients with history of trauma to the ear.

- 4) Diabetic
- 5) Recent use of ototoxic drugs

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. The patient lay in the supine position with his or her head tilted 45° to the healthy side. 0.5 ml of injection methyl prednisolone [40mg/ml] was injected into the middle ear through another site in the anterosuperior quadrant of the tympanic membrane. During this procedure, patients were instructed to avoid swallowing or moving for 30 minutes to maximize exposure of the round window membrane to the solution. All patients received five doses of intratympanic steroids with a gap of seven days in between the doses. After seven days of completion of the treatment, repeat audiometric testing done.

Definition of Recovery

Criteria for recovery documented by Haynes DS in their study was used in our study also¹⁰. Haynes DS used 20-dB improvement in PTA for success.

Complete Recovery: More than 20 db improvement in 2 consecutive frequencies.

Partial Recovery: Improvement between 0 and 20 db.

No Recovery: No change in PTA in any of the frequencies

Results

A total of 50 patients were included in the study of which unilateral cases were 45 and bilateral were 5 cases. A total of 55 cases received intratympanic steroids. Males were 32 and females were 18 with M:F ratio of 1.7:1. Right ear was affected in 35 and left in 20. The mean age was 44 years with the youngest

patient being 13 years and the oldest patient being 68 years as shown in Table 1.

Pre- procedure hearing loss was 29% cases had 51-60 dBHL, 27.2% cases had 61-70 dBHL, 18.1% cases had 71-80 dBHL, 14.5% cases had 41-50 dBHL and 10.9% cases had 41-50 dBHL as shown in Table 2.

Post procedure hearing loss was 32.7% cases had 31-40 dBHL, 32.7% cases had 41-50 dBHL, 21.8% cases had 21-30 dBHL, 9% cases had 21-30 dBHL, 1.8% cases had 61-70 dBHL and 1.8% cases had 81-90 dBHL as shown in Table 3.

Improvement in hearing was assessed subjectively and objectively. Subjectively 36 patients reported improvement in hearing after the therapy while objectively 41 patients had improvement. The Mean PTA before ITS was 64.21 while Post treatment PTA was 42.27. Out of 41 patients which had improvement-Complete Improvement was seen in 23 patients and Partial improvement was seen in 18 ears. No improvement was seen in 2 patient.

Discussion

The study included 50 patients and 55 ears. In the study 2.5% [5 out of 50] of the patients had bilateral pathology while another study by Fetterman reported the incidence of bilateral pathology to be 1.7% in their study¹¹. A study by Jeong-Hoon Oh report the incidence of bilateral disease to be very low¹².

In all patients intratympanic methyl prednisolone 0.5 ml was used. A study by Ljiljana Cvorovic et al. report better hearing outcomes with intratympanic methylprednisolone when compared to intratympanic dexamthasone in sudden sensorineural hearing loss¹³.

Subjective improvement in hearing was reported in 83.72% [36/43] of the patients while objective improvement was found in 95.34% [41/43] of the patients. 2 patients had objective improvement while

they did not have subjective improvement as they fell in profound hearing loss category even after 20 db improvement post therapy.

Overall success rate in the study was 95.34% while in a study done by Khaimook W et al. found overall improvement of 45.2%¹⁴.

Objective improvement in the PTA by more than 20 db in 2 consecutive frequencies was the criteria used to Complete Recovery in our study. Haynes DS in their study¹⁰ also used the same criteria to define improvement in the hearing outcome.

The mean of the baseline audiogram [PTA average of 500 Hz to 4 Hz] before and after completion of treatment was 64.21 and 42.27 respectively. A study done in china by Li Peng reported improvement from 64.8 db to 52.9 db¹⁵.

In the patients below the age of 20 years—100% [2/2] of the patients showed improvement while 90.62% [29/32] of the patients between the age group of 21 - 50 had improvement and 56.25 % [9/16] above the age of 50 had improvement. Younger age responded better compared to the older age group. Wilson et al. reported age as a prognostic factor to determine the improvement of hearing. Patients with age less than 40 years respond better compared to older patients¹. Detoriation of hearing was not reported subjectively by any of the patients

None of the patients reported any major complications. Only transient nausea, vertigo and pain were reported by the patients. A report by Li Peng also describes no major complications in their study and only one patient developed persistent tympanic membrane perforation¹⁵.

Sudden sensorineural hearing loss is a true otological emergency which requires to be managed effectively. Thorough evaluation of the patient is mandatory before starting any type of therapy. Various Studies indicate

different modalities of treatment for this condition but in our centre we chose intratympanic methylprednisolone as the first line of therapy in all patients with sudden sensorineural hearing loss.

Conclusion

Intratympanic steroids 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.

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References

1. Wilson, W.R., Byl, F.M. and Laird, N. (1980) The Efficacy of Steroids in the Treatment of Idiopathic Sudden Hearing Loss. A Double-Blind Clinical Study. *Archives of Otolaryngology*, 106, 772-776.
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. Hughes, G.B., Freedman, M.A., Haberkamp, T.J. and Guay, M.E. (1996) Sudden Sensorineural Hearing Loss. *Otolaryngologic Clinics of North America*, 29, 393-405.
4. Anderson, R.G. and Meyerhoff, W.L. (1983) Sudden Sensorineural Hearing Loss.

- Otolaryngologic Clinics of North America, 16, 189-195.
5. Fetterman BL, Saunders JE, Luxford WM. Prognosis and treatment of sudden sensorineural hearing loss. Am J Otol. 1996; 17:529-536
 6. 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 Sensorineural Hearing Loss. Brazilian Journal of Otorhinolaryngology, 76, 499-509.
 7. Slattery WH, Fisher LM, Iqbal Z, Friedman RA, Liu N. Intratympanic steroid injection for treatment of idiopathic sudden hearing loss. Otolaryngol Head Neck Surg. 2005;133: 251-259.
 8. Cinamon U, Bendet E, Krononberg J. Steroids, carbogen or placebo for sudden hearing loss: a prospective double-blind study. Eur Arch Otorhinolaryngol. 2001;258: 477-480.
 9. Alimoglu Y, Inci E, Edizer DT, Ozdilek A, Aslan M. Efficacy comparison of oral steroid, intratympanic steroid, hyperbaric oxygen and oral steroid 1 hyperbaric oxygen treatments in idiopathic sudden sensorineural hearing loss cases. Eur Arch Otorhinolaryngol. 2011;268:1735-1741.
 10. Haynes, D.S., O'Malley, M., Cohen, S., Watford, K. and Labadie, R.F. (2007) Intratympanic Dexamethasone for Sudden Sensorineural Hearing Loss after Failure of Systemic Therapy. Laryngoscope, 117, 3-15.
 11. Fetterman, B.L., Luxford, W.M. and Saunders, J.E. (1996) Sudden Bilateral Sensorineural Hearing Loss. Laryngoscope, 106, 1347-1350.
 12. Oh, J.-H., Park, K., Lee, S.J., Shin, Y.R. and Choung, Y.-H. (2007) Bilateral versus Unilateral Sudden Sensorineural Hearing Loss. Otolaryngology—Head and Neck Surgery, 136, 87-91.
 13. 2016 Intratympanic Steroid Treatment in Idiopathic Sudden Sensorineural Hearing Loss. A Control Study.
 14. Khaimook, W. and Jantarapattana, K. (2011) Therapy of Idiopathic Sudden Sensorineural Hearing Loss with Intratympanic Steroid Injection. Journal of the Medical Association of Thailand, 94, 1495-1499.
 15. Li, P., Zeng, X.-L., Ye, J., Yang, Q.-T., Zhang, G.-H. and Li, Y. (2011) Intratympanic Methylprednisolone Improves Hearing Function in Refractory Sudden Sensorineural Hearing Loss: A Control Study. Audiology and Neurotology,

Legends Table

Table 1: age distribution of study group

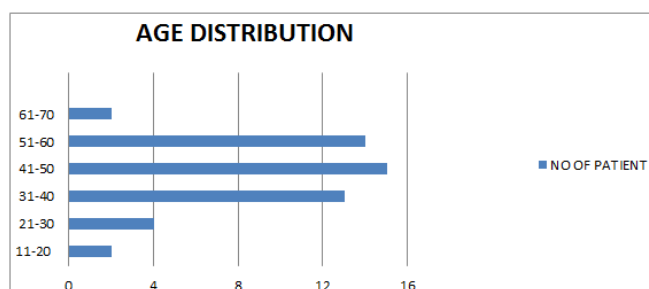


Table 2: pre -procedure hearing loss in study group

PTA before the procedure(DBHL)	Number of cases
41-50	8
51-60	16
61-70	15
71-80	10
81-90	6

Table 3: post procedure hearing loss in study group

PTA After The Procedure (DBHL)	Number of Cases
21-30	12
31-40	18
41-50	18
51-60	5
61-70	1
71-80	-
81-90	1