

## A Hospital Based Retrospective Assessment of the Efficacy of Short Course Intravenous Methylprednisolone in the Management of SSNHL

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### Abstract

**Aim:** The aim of this study was to determine the efficacy of short course intravenous methylprednisolone in the management of SSNHL.

**Methods:** A retrospective review of the record data of the cases with SSNHL who received short course methylprednisolone therapy was conducted in the department of ENT-head and neck surgery, Anugrah Narayan Magadh Medical College and hospital, Gaya India for 6 months. Record data of 50 patients who met the inclusion criteria were included in the study.

**Results:** There were 32 males (64 %) and 18 females (36%). The age of the patients ranged from 18 to 72 years, with the mean age being 40.59 years. In the age group 0-20 years there were four (8%) patients, in 20-40 years there were 25 (50%) patients, in 40-60 years there were 14 (28%) patients, and in >60 years there were 7 (14%) patients. Thirty one (62%) were admitted within three days of presentation and 19 (38%) were after three days. At presentation, 6 (12%) patients had mild hearing loss, ten (20%) had moderate, and 34 (68%) had severe hearing loss. The presence of vertigo, tinnitus or comorbidities didn't have any significant bearing on hearing recovery.

**Conclusion:** Short course intravenous methylprednisolone is effective in the treatment of SSNHL with minimal side effects.

**Keywords:** Sudden sensorineural hearing loss, Methylprednisolone, Steroids.

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### Introduction

Sudden sensorineural hearing loss (SSNHL) is relatively uncommon but may pose a significant problem for patients and a challenge for otolaryngologists. The sudden loss of hearing can be quite devastating to patients and may affect the quality of life. It was first described in

1944 by DeKleyn. [1] SSNHL is defined as a decline in hearing over 3 days or less affecting 3 or more contiguous frequencies by 30 dB or greater with no identifiable etiology. [2] The estimated incidence is 5–20 cases per 100,000, with viral infection being the most common etiological factor. [3] Other etiologies include vascular

occlusion and inner ear membrane breaks, acoustic neuroma, autoimmune inner ear disease. [4,5]

The hearing loss (HL) is nearly always unilateral and is commonly associated with tinnitus and aural fullness. It was also noticed that the severe sudden onset of hearing loss associated with other inner ear symptoms like vertigo, has poorer chance of recovery. SSNHL is an ontological emergency and an early therapy is critical to recovery. High dose systemic steroids have been used and proved to be an effective method of treatment and are by far the most agreed upon line of treatment for SSNHL. [2] Although proven to be effective in randomized, double-blind, placebo-controlled trials [2,6] other studies have questioned the efficacy of systemic steroids in the treatment of SSNHL. [3,7,8] Other proposed lines of treatment include vasodilators, antiviral agents, hyperbaric oxygen, and plasma pheresis.

For recovery and improvement of the patient, early diagnosis and treatment are needed and steroids have been the mainstay for the treatment of SSNHL. [9] Nowadays, they are given either alone or in combination with other drugs. Apart from steroids, the other treatment modalities include antiviral agents, vasodilators, hyperbaric oxygen, plasmapheresis, etc. along with the treatment of the underlying cause. Factors affecting the prognosis include the time of initial presentation, age of the patient, severity of the hearing loss, the frequencies affected, presence of vertigo, tinnitus, and various associated comorbidities. There has been no consensus on the mode of delivery, dose, and duration of the treatment although steroid has been a mainstay in treating this disease. Moreover, it has got several adverse effects. Thus, steroids should be administered in such a way that an adequate dose is provided within a short period of time so that there are minimal complications.

Thus, the objective of this study was to determine the efficacy of short-course intravenous methylprednisolone in the management of Sudden sensorineural hearing loss.

### Materials and Methods

A retrospective review of the record data of the cases with SSNHL who received short course methylprednisolone therapy was conducted in the department of ENT-head and neck surgery, Anugrah Narayan Magadh Medical College and hospital, Gaya, India for 6 months, after obtaining ethical clearance from the institutional review committee. Record data of 50 patients who met the inclusion criteria were included in the study.

This review encompassed the variables like pre-treatment hearing loss level, time of presentation since the onset of the symptoms, duration of therapy, post-treatment hearing level, and associated comorbid factors. Record data with incomplete documentation of the aforementioned variables were excluded from the analysis. As per our departmental protocol, we consider intravenous methylprednisolone in cases that present with SSNHL within seven days of its onset. Intravenous methylprednisolone is not considered in cases with uncontrolled DM, hypertension, and any other medical conditions where systemic steroids are contraindicated. These patients receive steroids via the intratympanic route. On admission, the patients receive injection methylprednisolone 1 gm IV stat followed by 500 mg IV once daily for two consecutive days. Cases that do not recover completely are prescribed with 1 mg/kg/day of oral prednisolone for 11 days. In this study, we have however assessed the hearing improvement after completion of methylprednisolone therapy only. The criteria for audiological recovery were further classified as: (i) complete recovery if the hearing level is within 10 dB of the normal hearing ear, (ii) partial recovery if improvement of >10 dB pure

tone threshold, and (iii) no recovery if no improvement or improvement of <10 dB in pure tone threshold. Statistical analysis was done using the paired-t test, chi-

square, and Wilcoxon signed-rank test. SPSS version 20 was used for the analysis.

## Results

**Table 1: Demographic details**

Variables	N%
<b>Gender</b>	
Male	32 (64)
Female	18 (36)
<b>Age groups</b>	
0-20	4 (8)
20-40	25 (50)
40-60	14 (28)
>60	7 (14)
<b>Days of presentation</b>	
Within 3 days	31 (62)
After 3 days	19 (38)
<b>Hearing loss</b>	
Mild	6 (12)
Moderate	10 (20)
Severe	34 (68)

There were 32 males (64 %) and 18 females (36%). The age of the patients ranged from 18 to 72 years, with the mean age being 40.59 years. In the age group 0-20 years there were four (8%) patients, in 20-40 years there were 25 (50%) patients, in 40-60 years there were 14 (28%) patients, and in >60 years there were 7 (14%) patients. Thirty one (62%) were admitted within three days of presentation

and 19 (38%) were after three days. At presentation, 6 (12%) patients had mild hearing loss, ten (20%) had moderate, and 34 (68%) had severe hearing loss. Vertigo was present in ten (20%) patients and tinnitus in 40 (80%) patients. Out of the 50 patients, 20 (40%) patients had comorbidities, with 10 having hypertension, five having diabetes mellitus, and three having hypothyroidism.

**Table 2: Hearing improvement in patients with and without vertigo, tinnitus, and co-morbidities**

Vertigo/tinnitus/ Co-morbidity	Hearing improvement			P Value
	Complete recovery	Partial recovery	No recovery	
Vertigo present	2	3	5	0.4371
Vertigo absent	10	20	10	
Tinnitus present	5	20	15	0.7137
Tinnitus absent	0	6	4	
Co-morbidities absent	2	12	6	0.4513
Co-morbidities present	5	15	10	

The presence of vertigo, tinnitus or comorbidities didn't have any significant bearing on hearing recovery. Cases with mild SSNHL showed complete recovery in

most of the cases, whereas most of the cases with severe SSNHL had no significant improvement at all. Collectively 16% of patients showed

complete recovery, 50.66 % showed no recovery.  
partial recovery, 33.34% of cases showed

**Table 3: Response to treatment according to severity of hearing loss**

Patient category	Average hearing loss prior to treatment (db)	Average hearing loss post treatment (db)
Mild SSNHL	32.25	30.25
Moderate SSNHL	51.83	47.33
Severe SSNHL	93.22	82.54

**Table 4: Table 4: Pre and post steroid PTA paired sample statistics and correlations**

Variables	Mean	N	SD	Std. Error mean	Correlation	Sig. p value paired t test
Pre-steroid PTA	77.84	50	26.657	4.712	0.850	0.000
Post-steroid PTA	69.41	50	29.307	5.181		

Pre-steroid PTA and post-steroid PTA values were compared by using paired t-test, which showed a statistically significant difference when applied for the entire sample together ( $p < 0.05$ ). But when we compared the pre-steroid PTA and post-steroid PTA values separately for each category using Wilcoxon sign rank test, only those with severe SSNHL showed statistically significant improvement following methylprednisolone injection ( $p < 0.05$ ), whereas mild and moderate SSNHL, didn't show statistically significant improvement ( $p > 0.05$ ).

### Discussion

Despite many treatment regimens tried in the past, only steroids have been proven as the most beneficial in the management of SSNHL. Steroids act as a potent inflammatory agent and are known to cause vasodilation with increased microvascular blood flow in the cochlea. [10] However, no consensus has yet been established regarding the dose, mode of delivery and duration of therapy.

A study done by Baysal et al comparing the effectiveness of systemic steroid versus combined systemic and intratympanic steroid treatment for SSNHL showed both had the same effect on the restoration of hearing. [11] Similarly, RCT done by Rauch et al which compared systemic and

intratympanic steroids in 16 centres enrolling 250 patients showed the hearing outcome did not differ between patients who received prednisolone and those who received four doses of intratympanic methylprednisolone over 14 days. [12] Based on these results, we considered the use of steroids systemically. A systemic review and meta-analysis done by Lin et al showed hypertension was found in 13.6% of SSNHL patients, whereas only 0.5% of the control populations were hypertensive. Diabetes was found in 6.5% of SSNHL patients compared to 0.15% of the control subjects. [13]

A study done by Wilson et al in 1980 brought steroids as a treatment for SSNHL showing a recovery rate of 61%. Eftekharian et al showed there was a significant improvement in hearing while using pulse methylprednisolone although it showed no superiority over oral conventional steroid therapy. In their study, out of 29 patients receiving the steroids, seven had complete, 10 had partial and 12 had no recovery. [14] Veldmann et al showed an effective response to glucocorticoid treatment in six (50%) of 12 patients, whereas only six (32%) of 19 non-treated patients showed similar results. [15] In another study by Narozny et al the group receiving pulse methylprednisolone showed significant

improvement in hearing when compared to a group receiving oral prednisolone. [16]

In our study mean hearing level before treatment was 77.84 dB (HL) and after treatment was 69.41 dB (HL), showing significant improvement in PTA, with a mean improvement of 8.43 dB. Similar to our study, Raghunandan et al using intravenous steroids also showed significant improvement in hearing loss with mean hearing level improving from an average of 79.53 dB (HL) before treatment to 42.33 dB (HL) after treatment. [17]

A large sample size study is needed to draw a definite conclusion. Also, as the natural course of this disease is not known, further studies are required to compare the disease progression naturally and with the use of steroids. [18]

### Conclusion

Comparing hearing loss, there was significant improvement after a short course of Methylprednisolone therapy. Short course Methylprednisolone can be an effective choice in a patient with SSNHL. Hearing outcomes are better in patients who do not have co-morbidities. Treatment must be of short duration to avoid complications although an adequate dose has to be provided.

### References

1. Kleyn AD. Sudden complete or partial loss of function of the octavus-system in apparently normal persons. *Acta Oto-Laryngologica*. 1944 Jan 1;32(5-6):407-29.
2. Wilson WR, Byl FM, Laird N. The efficacy of steroids in the treatment of idiopathic sudden hearing loss: a double-blind clinical study. *Archives of otolaryngology*. 1980 Dec 1;106(12):772-6.
3. Byl Jr FM. Sudden hearing loss: eight years' experience and suggested prognostic table. *The Laryngoscope*. 1984 May;94(5):647-61.
4. Stokroos RJ, Albers FW, Schirm J. The etiology of idiopathic sudden sensorineural hearing loss: experimental herpes simplex virus infection of the inner ear. *Otology & Neurotology*. 1998 Jul 1;19(4):447-52.
5. Fetterman BL, Saunders JE, Luxford WM. Prognosis and treatment of sudden sensorineural hearing loss. *Otology & Neurotology*. 1996 Jul 1;17(4):529-36.
6. Moskowitz D, Lee KJ, Smith HW. Steroid use in idiopathic sudden sensorineural hearing loss. *Laryngoscope*. 1984; 94:664-666.
7. Mattox DE, Simmons FB. Natural history of sudden sensorineural hearing loss. *Annals of Otology, Rhinology & Laryngology*. 1977 Jul;86(4):463-80.
8. Cinamon U, Bendet E, Kronenberg J. Steroids, carbogen or placebo for sudden hearing loss: a prospective double-blind study. *European archives of oto-rhino-laryngology*. 2001 Nov; 258(9):477-80.
9. 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.
10. Koca ÇF. Evaluation of idiopathic sudden sensorineural hearing loss. *Int J Otorhinolaryngol Head and Neck Surg*. 2015;1(1):2.
11. Baysal E, Tunç O, Baglam T, Durucu C, Oz A, Karatas ZA et al. Systemic steroid versus combined systemic and intratympanic steroid treatment for sudden sensorineural hearing loss. *J Craniofacial Surg*. 2013;24(2):432-4.
12. Rauch SD, Halpin CF, Antonelli PJ, Babu S, Carey JP, Gantz BJ, Goebel JA, Hammerschlag PE, Harris JP, Isaacson B, Lee D. Oral vs intratympanic corticosteroid therapy for idiopathic sudden sensorineural hearing loss: a randomized trial. *Jama*. 2011 May 25;305(20):2071-9.
13. Lin RJ, Krall R, Westerberg BD, Chadha NK, Chau JK. Systematic

- review and meta-analysis of the risk factors for sudden sensorineural hearing loss in adults. *Laryngoscope*. 2012;122(3):624-35.
14. Eftekharian A, Amizadeh M. Pulse steroid therapy in idiopathic sudden sensorineural hearing loss: A randomized controlled clinical trial. *Laryngoscope*. 2016;126(01):150-55.
  15. Veldman JE, Hanada T, Meeuwse F. Diagnostic and therapeutic dilemmas in rapidly progressive sensorineural hearing loss and sudden deafness a reappraisal of immune reactivity in inner ear disorders. *Acta otolaryngologica*. 1993;113(3):303-6.
  16. Narozny W, Sicko Z, Przewozny T, Stankiewicz C, Kot J, Kuczkowski J. Usefulness of high doses of glucocorticoids and hyperbaric oxygen therapy in sudden sensorineural hearing loss treatment. *Otology & Neurotology*. 2004 Nov 1;25(6):916-23.
  17. Raghunandhan S, Agarwal AK, Natarajan K, Murali S, Kumar RA, Kameswaran M. Effect of intravenous administration of steroids in the management of sudden sensori-neural hearing loss: our experience. *Indian J Otolaryngol Head Neck Surg*. 2013; 65 (3):229-33.
  18. Pyar K. P., Aung C. A., Myo A. S., Htun, Y. M., Maung T. Z., Hlaing S. W., Aung Z. N. H., Maung N. L., Kyaw A. P., Oo M. L. Z., Zar S. K. T., Aung N. M., Oo P. H., Win S. T. Z., Win N. A., & Oo A. K. Combined effect of low dose atorvastatin, aspirin, clopidogrel and cessation of smoking for one year on totally occluded left anterior descending coronary artery in 39-year-old obese physician: a case report. *Journal of Medical Research and Health Sciences*. 2022; 5(3): 1825–1831.