e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(11); 921-926

Original Research Article

A Hospital Based Retrospective Study to Determine the Efficacy of Short-Course Intravenous Methylprednisolone in the Management of Sudden Sensorineural Hearing Loss

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Received: 11-09-2022 / Revised: 18-10-2022 / Accepted: 27-11-2022

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Conflict of interest: Nil

Abstract

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

Methods: A retrospective review of the record data of the cases with SSNHL who received short course methylprednisolone therapy for one year was conducted in the Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India for one year. 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 5 (10%) 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 6 (12%) patients.

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.

Keywords: Sudden sensorineural hearing loss, Methylprednisolone, Steroids

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 otological 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. It had been noticed in many studies that the earlier the onset of treatment, the better the chance of recovery the patient has.

SSNHL is usually unilateral and is commonly associated with tinnitus, aural fullness, and sometimes vertigo. 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.

Methods

A retrospective review of the record data of the cases with SSNHL who received short course methylprednisolone therapy for one year was conducted in the Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India for one year. 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

Age in years	**N%**
0-20	5 (10%)
21-40	25 (50%)
31-60	14 (28%)
>60	6 (12%)
Gender	
Male	32 (64%)
Female	18 (36%)
Hearing loss category	
Mild	6 (12%)
Moderate	10 (20%)
Severe	34 (68%)
Systemic diseases	
Co-morbidities	20 (40%)
Diabetes Mellitus	5 (10%)
Hypertension	9 (18%)
Hypothyroidism	3 (6%)

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 5 (10%) 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 6 (12%) patients. At presentation, 6 (12%) patients had mild hearing loss, 10 (20%) had moderate, and 34 (68%) had severe hearing loss. Out of the 50 patients, 13 (40%) patients had comorbidities, with nine having hypertension, five having diabetes mellitus, and three having hypothyroidism.

Table 2: 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

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.

Table 3: Hearing outcomes in patients after intravenous steroids

Hearing loss at presentation	**Hearing at discharge**		
	Complete recovery (5)	**Partial recovery (25)**	**No recovery (20)**
Mild SSNHL	5	0	3
Moderate SSNHL	0	7	5
Severe SSNHL	0	18	12

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	0.852	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 value<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 methylpredniso - lone injection (p value <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. Having a greater possibility of increased concentration of the drug in the inner ear, either intratympanic or intravenous route is often considered. However, intratympanic route of delivery is often associated with pain, vertigo, and perforation of the tympanic membrane.

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]

Thirteen patients were found to have premorbid conditions where the majority of cases had hypertension followed by type 2 DM. 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%.4 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. [17,18]

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.

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