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EFFECTIVENESS OF PULSE METHYLPREDNISOLONE IN TREATING SUDDEN SENSORINEURAL HEARING LOSS.

ABSTRACT

Objectives

Objective of this study was to evaluate the efficacy of intravenous Methylprednisolone followed with or without by oral prednisolone in treating (SSNHL) sudden sensorineural hearing loss.

Material and methods

This was a prospective interventional study conducted at Ganesh Man Singh Memorial Academy for ENT-Head and Neck Studies, Tribhuvan University Teaching Hospital, Kathmandu, Nepal including 30 cases. Cases presenting with SSNHL within 7 days of onset were admitted. One gram Methylprednisolone intravenous on day of admission and 500 mg of Methylprednisolone for 2 consecutive days was given. Those who had normal hearing after 3rd dose were discharged without any medications and those who didn't improve were discharged on oral prednisolone at a dose of 1mg/kg over 11 days. Hearing evaluation was done pure tone audiometer on every third day.

Results

Of the 30 patients, 12 had complete recovery, 6 had partial recovery and 12 had no recovery. Patients falling in the low risk group showed significant improvement compared to high risk group.

Conclusion

Methylprednisolone is effective in treating SSNHL with a short duration of therapy and minimal side effects. However, a study with a larger sample size will be required to draw a definite conclusion.

Key words

Methylprednisolone, Prednisolone, Pulse, Sudden sensorineural hearing loss

INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is not an uncommon entity. It is defined as hearing loss of 30 dB or more over at least 3 contiguous frequencies within a period of 72 hours. [1] Incidence of this disease ranges from 5 to 20 cases per 100,000 persons.[2] There is no gender variation, with equal incidence between male and female. The age of presentation usually ranges from 40 to 54 years[3] however, it can present at any age. Several aetiological factors have been put forth such as viral infections, vascular occlusion, membrane breaks, immunological and activation of cochlear nuclear factor kappa B.[4]

Despite of several etiological factors being postulated, the disease cannot be attributed to a single identifiable cause. Thus, it has led to trial of various forms of treatment such as antivirals, vasodilators, thrombolytics, hemodilution, anti-oxidants, carbogen etc. Among all these treatment, steroid is found to have a proven efficacy.[1] Systemic and intratympanic steroid administration either alone or in combination is widely practiced nowadays. A study done by Garavello et al showed the effectiveness of intratympanic steroids more as a salvage therapy.[5] Although steroid has been effective in treating this disease, there has been no consensus on mode of delivery and treatment duration and on the other hand it has got several adverse effects. Thus, administration of steroid should be in such a way that the adequate dose is provided within a short period of time so that there are minimal complications.

Our rationale of using Methylprednisolone was that it is a potent steroid and the dose requirement is minimal as compared to drugs such as hydrocortisone so that the duration of hospital stay and the complications related to prolonged steroid therapy are minimized. The objective of this study was to evaluate the efficacy of pulse intravenous Methylprednisolone followed with or without by oral prednisolone in treating SSNHL.

MATERIALS AND METHODS

This was a prospective interventional study conducted at Ganesh Man Singh Memorial Academy for ENT-Head and Neck Studies, Tribhuvan University Teaching Hospital, Kathmandu, Nepal from July 2015 to December 2016 after obtaining ethical clearance-from institutional review committee. All cases meeting the criteria for SSNHL and presenting within 1 week of onset were included in the study. Cases presenting with SSNHL after 7 days of onset and those with uncontrolled DM and HTN, where Methylprednisolone is contraindicated, were excluded. Our final sample size was 30. Of them, one case had to be referred to oncology care outside the hospital for chemotherapy after being diagnosed as a case of leukemia.

All included cases were admitted on the day of presentation. We classified the patients into two groups as High risk group and Low risk group.

High risk group included patients presenting after 72 hours, with moderate to severe hearing loss, vertigo on presentation, ESR >60mm/hour and with pre morbid conditions like DM, HTN, hypo/hyperthyroidism, dyslipidemia, autoimmune disease, malignancy etc.

Low risk group included patients: presenting before 72 hours, with mild hearing loss, no vertigo on presentation, ESR <60mm/hour and no associated pre morbid conditions.

After hospital admission a panel of investigations including Pure Tone Audiometry (PTA), Tympanogram, CBC, ESR, blood glucose, lipid profile, renal function test, ANA, ds DNA, RPR/VDRL, Thyroid Function Test (TFT), chest X-ray were done. One gram Methylprednisolone was given on same day followed by 2 consecutive doses of 500 mg per day. Pure tone audiogram was repeated on third day. Those who recovered their hearing to a normal level were discharged without any medications. However, incompletely recovered cases were prescribed with 1mg/kg of oral prednisolone for 11 days and were stopped earlier if there was recovery of hearing during the course of treatment. On completing the course, those not responding to medication were the advised for MRI brain to rule out vestibular schwannoma.

Recovery was further classified as :

(i) complete recovery if hearing level within 10 dB of normal hearing ear,

(ii) partial recovery if improvement of >10 dB pure tone threshold and

(iii) no recovery if no improvement in pure tone threshold.

Statistical analysis were done using chi-square test. SPSS version 18 was used for the analysis.

RESULTS

Total of 30 patients who met the inclusion criteria were included in the study. Twenty of them were male and 10 were female. Age distribution of the patients is shown in the bar graph (Fig.I).

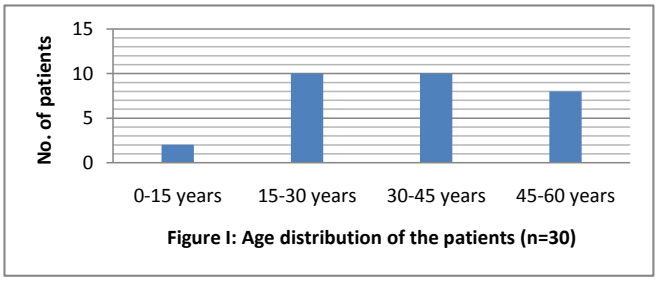

Figure I: Age distribution of the patients (n=30)

Table 1: Pre-morbid conditions of the patients (n=13)

Pre-morbid conditions	Number of patients
Hypertension	2
Diabetes Malietus	6
Hypothyroidism	1
Leukemia	1
Vestibular Schwannoma	1
Hepatitis C	1
Autoimmunity	1

ESR value > 60mm/hr was taken as a bad prognostic factor and was found to be higher in only 6 patients (Table 2).

Table 2: ESR of the patients (n=30)

ESR	Number of patients
Less than 60mm in 1st hour	24
More than 60mm in 1st hour	6

Table 3: Timing of presentation (n=30)

Timing of presentation	Number of patients
Within 72 hours	16
After 72 hours	14

Table 4 : Vertigo at presentation (n=30)

Vertigo	Number of patients
Present	2
Absent	28

Table 5: Hearing loss at presentation

Hearing loss	Number of patients
Mild	6
Moderate	5
Moderately Severe	4
Severe	6
Profound	9
Total	30

Of the 30 patients, 12 had complete recovery, 6 had partial recovery and 12 had no recovery.

Table 6. Hearing outcomes in patients according to the degree of hearing loss at presentation

Hearing loss at presentation	Hearing at discharge		
	No recovery	Complete recovery	Partial recovery
Mild	0	6(100%)	0
Moderate	0	3(60%)	2(40%)
Moderately severe	3(75%)	1(25%)	0
Severe	2(33.3%)	2(33.3%)	2(33.3%)
Profound	7(77%)	0	2(22.2%)

p-Value: 0.004 Pearson's Chi-square test

Amongst the patients who had complete recovery in hearing ,83.3% were of low risk and 29.2 % were of high risk patient. 25 % of high risk patients had partial recovery. All these results were statistically significant (*p* value 0.049) using Pearson's chi-square test (table 7).

Table 7. Hearing outcomes in relation to risk stratification

Risk	No recovery	Complete recovery	Partial recovery
Low (n=6)	1(16.7%)	5(83.3%)	0
High (n=24)	11(45.8%)	7(29.2%)	6(25%)

p-value: 0.049 Pearson's Chi-square test

DISCUSSION

Despite of several etiological factors being postulated, treatment of SSNHL still remains controversial. Amongst many treatment regimens tried in the past, steroids have shown to have a beneficial role. However, there has been no consensus regarding the dose, mode of delivery and the duration of therapy. Considering its systemic adverse effects, logical approach would be to provide the effective dose within a short period of time systemically or topically. However, it is reserved for the cases with contraindications of systemic therapy and as a salvage therapy. The objective of our study was to evaluate the efficacy of pulse intravenous Methylprednisolone followed with or without by oral steroids in treating SSNHL.

Our study showed the disease was more common in male than in female with a ratio of 2:1, mostly presenting at 2 to 4 decades of life. Thirteen patients were found to have pre morbid conditions where majority of cases had type 2 DM. We were able to pick some rare premorbities such as leukemia, vestibular schwannoma and Hepatitis C with positive ANA, one cases each presenting as SSNHL. Lee et al in their study of 295 patients found vestibular schwannoma in 4% of cases.[6] Although the incidence of acute leukemia among the cases of SSNHL has not been much mentioned in literatures, SSNHL can also be one of the presentations of hematological malignancies.[7,8]

Out of 30 patients, 12 patients had complete recovery, 6 had partial recovery and 12 had no recovery at all. Among the 6 patients falling in the low risk group, 5 had complete recovery and 1 had no recovery at all. Similarly, out of 24 patients in high risk groups only 7 had complete and 6 had partial recovery. This finding too was statistically significant (*p* value = 0.049). All patients with mild to moderate hearing loss showed improvement during the course of treatment with 9 having complete and 2 having partial recovery. In cases where degree of hearing loss at presentation ranged from moderately severe to profound, only 2 cases had complete and 4 cases had partial recovery. Majority of the patients in this group (12 cases) had no recovery.

In a study done by Eftekharian et al there was significant improvement in hearing while using pulse Methylprednisolone although it showed no superiority over oral conventional steroid therapy.[9] Of 29 patients receiving the treatment 7 had complete, 10 had partial and 12 had no recovery. Narozny et al in their study however, showed significant improvement in hearing in the group receiving pulse Methylprednisolone when compared to group receiving oral prednisolone.[10] Gupta et al[11] in their study used high dose intravenous

Methylprednisolone followed by oral Prednisolone with Pentoxyfylline and Methylcobalamin. About 35% patients showed complete recovery while 40.54% and 24.32% patients had partial and no recovery respectively. Cases presenting within less than 72 hours and those with mild to moderate hearing loss had better recovery rates that were similar to our study.

CONCLUSION

Steroid has definite role in treating SSNHL. To avoid complications, treatment course must be of short duration although adequate dose has to be provided. Methylprednisolone can be an effective choice in this scenario. None of the patients in our study developed steroid related adverse effects. However, a large sample size study is needed to draw a definite conclusion. Also, as the natural course of this disease is not known so further studies are required to compare between the disease progression naturally and with the use of steroids.

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