



Effect of administration of steroids in the management of sudden sensorineural hearing loss – Our experience

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Abstract: The aim of this study was to investigate the efficacy and outcome of IV steroids followed by oral steroids in patients with sudden sensorineural hearing loss (SSHL). The study also evaluated the various comorbidities influencing the outcome of treatment with steroids. 30 patients who presented to the ENT department with sudden sensory neural hearing loss during the 15 month period from January 2013 to March 2014 were included in the study. Of the 30 patients, 20 were males and 10 females and they were in the age range of 20 to 60 years. Treatment was in the form of intravenous (IV) Hydrocortisone 100mg as a stat dose followed by IV Dexamethasone 8mg 8th hourly and then tapered over 5 days. This is followed by oral Prednisolone for 2 weeks. A pretreatment and follow up pure tone audiometry (PTA) was done and compared. According to our study, emergency administration of IV steroids to patients with sudden sensorineural hearing loss is highly recommended. The critical time for commencing treatment is within 6 hours from the onset of symptoms.

Key words: Intravenous steroids; Oral steroids; Sudden Sensorineural Hearing Loss (SSHL)

Introduction

Sudden sensorineural hearing loss (SSHL) is relatively uncommon but causes significant problem for affected patients. It was first described by De Kleyn in 1944 and it affects the quality of life, especially in the young [1]. It is defined as a decrease in hearing over 3 days or less affecting 3 or more sequential frequencies by 30 dB or more without any identifiable causes [2]. The hearing loss is mostly unilateral but bilateral cases have been reported.

The commonest etiology is viral [3] followed by vascular occlusion, inner ear membrane break, autoimmune inner ear disease and acoustic neuroma. SSHL is a medical emergency and early therapy is important for prompt recovery. High dose systemic steroids have been proved to be an effective treatment. Associated symptoms like vertigo and tinnitus also improved following steroid therapy. Patients with low frequency hearing loss have a

better chance of improvement. Other treatment modalities include vasodilators, antiviral agents, hyperbaric oxygen and plasmapheresis.

Aims & Objectives

The primary objective of our study was to evaluate the efficacy of high dose IV steroids followed by oral steroids in patients with sudden sensorineural hearing loss (SSHL). We also analyzed the various risk factors like diabetes mellitus and hypertension influencing the outcome of treatment and evaluated the improvement in vertigo and tinnitus coexistent with SSHL.

Materials and Methods

After obtaining institutional ethical committee approval and patient's informed consent, 30 patients who presented to our department with sudden sensorineural hearing loss over a period of 15 months from January 2013 till March 2014 were included in the study.

On admission, patient was evaluated by taking a proper history especially regarding duration of hearing loss and associated symptoms. Clinical otologic examination, pure tone audiometry (PTA), impedance audiometry & BERA (in selected cases) were done in affected patients. Radiological evaluation in the form of MRI & CT scan and complete blood work up which include blood routine examination, random blood sugar, renal, liver & thyroid function tests, lipid profile, RA factor and C-reactive protein (CRP) were also done.

Patients were then divided into 2 groups. Group A – included SSHL patients with no comorbidities.

Group B – SSHL patients with comorbidities like hypertension, diabetes mellitus and hypothyroidism. There were 20 patients in group A and 10 in group B.

All patients received an initial dose of inj. Hydrocortisone 100mg IV (single dose) followed by inj. Dexamethasone 8mg IV 8th hourly for 2 days and then tapered over the next 3 days. After 5 days admission in the hospital, a repeat pure tone audiometry (PTA) was done. Patients were discharged on the 6th day with oral Prednisolone 30mg in divided doses, tapered gradually over a period of 2 weeks. A repeat PTA was done on follow up at 2 weeks. Along with steroids, patients were also put on neuro vitamins, Betahistine & labyrinthine sedatives especially in patients with associated symptoms of vertigo and tinnitus.

During the course of treatment, patients with diabetes mellitus showed a rise in blood glucose levels and they were managed with insulin in appropriate doses.

The criteria for audiological improvement was based on that used by Furuhashi et al. as

Complete recovery – hearing threshold less than 25 dB

Marked improvement – PTA improvement of more than 30 dB

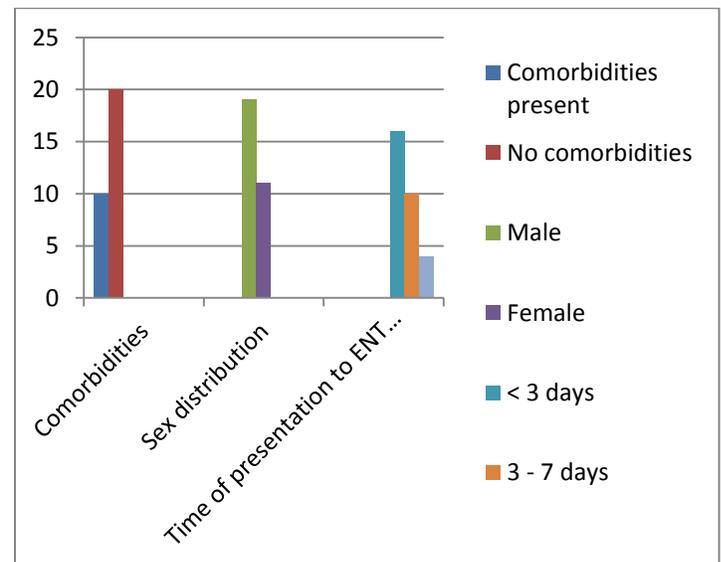
Slight improvement – PTA improvement of 10 – 30 dB

No improvement – PTA improvement of less than 10 dB

Results

In our study population of 30 patients, 20 patients had no comorbidities and 10 were with comorbidities like hypertension, diabetes mellitus, hypothyroidism and hypercholesterolemia. Out of 30 patients, 16 patients presented within the first 3 days, 10 patients during the first week and 4 after 1 week. 24 patients had a unilateral sensorineural hearing loss and 6 had bilateral hearing loss. The age range was from 20 – 60 years and there were 19 male and 11 female patients.

Chart 1



18 patients had low frequency hearing loss with normal hearing in high frequencies. Patients with severe degree of hearing loss showed less response to treatment than those with mild to moderate hearing loss.

The mean hearing level improved from an average of 79.43 dB to 35.46 dB after treatment. In patients with hearing loss at low frequency, PTA improved from 76.33 dB to 32.6 dB and in high frequency hearing loss, PTA improved from 82.53 dB to 38.33 dB.

Out of the 18 patients with hearing loss in low frequencies, 9 completely recovered (50%), 5 showed marked improvement (27.77%) and 2 patients slight improvement (11.11%). Two patients didn't recover at all (11.11%).

Of the 12 patients with high frequency hearing loss, 4 completely recovered (33.33%), 2 showed marked improvement (16.66%), 1 slight improvement (8.33%) and 5 patients didn't recover at all (41.66%).

Of the 30 patients, 24 patients had unilateral sensorineural hearing loss and 6 had bilateral hearing loss. 3 of the 7 patients who didn't recover at all had bilateral hearing loss.

Table 1 – Analysis of hearing improvement

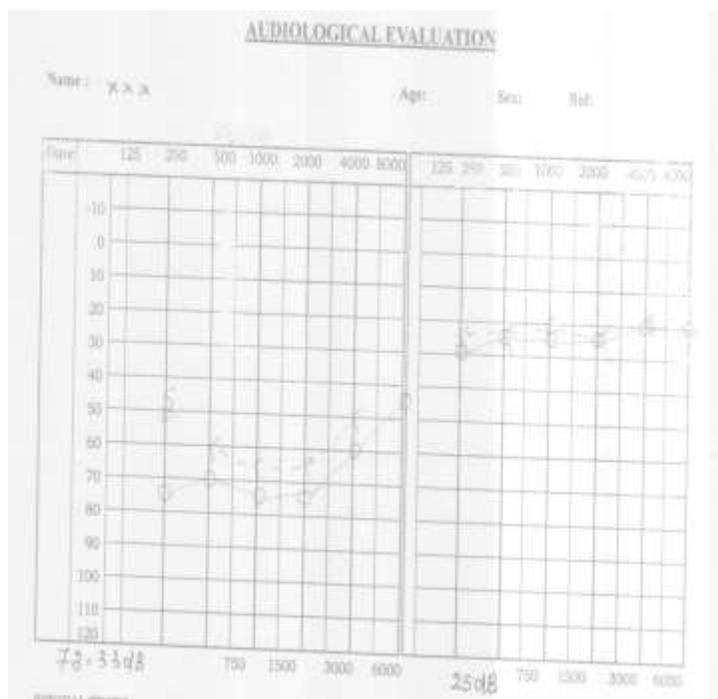
Hearing improvement	Low frequency loss (n ₁ = 18)	High frequency loss (n ₂ = 12)
Complete	9 (50%)	4 (33.33%)
Marked	5 (27.77%)	2 (16.66%)
Slight	2 (11.11%)	1 (8.33%)
No improvement	2 (11.11%)	5 (41.66%)

In our study, group A patients had a better outcome than group B patients, who had comorbidities like HT & DM.

Table 2 – Comparison of pre and post treatment PTA threshold

Hearing loss	Mean pretreatment PTA	Post treatment PTA (after 6 weeks)
Low frequency HL (n ₁ = 18)	76.33 dB	32.6 dB
High frequency HL (n ₂ = 12)	82.53 dB	38.33 dB
Total (n = 30)	79.43 dB	35.46 dB

Figure 1 - Audiogram (Pre & post treatment)



Discussion

Steroids as a treatment for sudden sensorineural hearing loss have emerged due to work done by Wilson et al [2] who demonstrated a recovery rate of 61%. The interval between the onset of symptoms and medical care appear to be critical in restoring hearing. Systemic steroids orally or intravenously (IV) have been the mainstay of treatment for SSHL [2]. Steroids are supposed to cause vasodilatation with increased microvascular

blood flow in the cochlea. In Germany, high dose IV Prednisolone (250 mg/day) is a standard treatment for SSHL and showed to result in high perilymphatic cortisol level [4].

Moskowitz et al [5] stated that 24 out of 27 glucocorticoid treated patients recovered 50% of their hearing whereas 4 of 9 patients recovered hearing without any treatment. Veldmann et al found an effective response to glucocorticoid therapy in 6 of 12 patients (50%) whereas 6 of 19 (32%) non treated patients showed a similar result.

In our study, 13 of 30 patients (43.33%) showed complete recovery whereas marked improvement was seen in 7 patients (23.33%). There was slight improvement in 3 patients (10%) and no improvement in 7 cases (23.33%).

We have observed a significant improvement in pure tone audiometry (PTA) with a mean improvement of 44 dB in both low and high frequency hearing losses. The findings of our study can be compared with those presented in literature.

We also observed that low frequency hearing losses are earlier reversed than high frequency losses. If there is no improvement of hearing after a period of 2 months with or without treatment, supportive rehabilitation should be considered.

The observation from our study in group B patients with comorbidities showed poorer outcomes compared to group A patients (no comorbidities). This stresses the fact that comorbidities influence the outcome in steroid therapy for SSHL.

Conclusion

- Based on our study, we like to conclude that administration of high dose of IV steroids followed by oral steroids is very effective for the treatment of SSHL.
- Better results were observed in patients without comorbidities and high frequency hearing preservation.
- Steroid therapy results are best when commenced within 6 hours of onset of deafness. Therefore, IV steroids should be considered as first line of treatment in patients with SSHL, managed in an in-patient setup followed by oral steroid therapy at the time of discharge from the hospital.

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