

Sudden sensorineural hearing loss in adults — our experience with a multidrug high-dose steroid regimen at a tertiary care hospital

Vivek Gupta, Abhineet Jain, Praveer K. Banerjee, Sonam Rathi

Department of ENT and Head & Neck Surgery,
JLN Hospital, Bhilai, Chhattisgarh, India

Correspondence to Abhineet Jain, DLO, DNB,
Department of ENT and Head & Neck Surgery,
JLN Hospital & RC, Sector-9, Bhilai 490009,
Chhattisgarh, India
E-mail: abhineetjn@gmail.com

Received 29 July 2015

Accepted 27 September 2015

The Egyptian Journal of Otolaryngology
2016, 32:105–109

Introduction

Sudden sensorineural hearing loss is a confusing and controversial issue in our practice since no standard definition, evaluation method and treatment protocol exists. It is more a symptom than a disease entity. It is an otological emergency with narrow golden period of treatment.

Objective

To establish the early diagnosis, treatment and study the outcome of treatment.

Design and method

It is a prospective study, including patients >18 year age who had presented with sudden sensorineural hearing loss in ENT opd. Patients underwent general systemic and ENT examination, pure tone audiometry, impedance audiometry and necessary imaging. After diagnosis patients were treated with i.v. methylprednisolone 2 gm loading dose on day 1 followed by 1 gm BD for 2 days. and then tab. Prednisolone (1 mg/kg/day) for 5 days, gradually tapered over next 10 days along with tab. pentoxyfylline 400 mg TDS for 14 days with inj. methylcobalamin i.m. OD for 3 days. Pure tone audiogram was repeated on 4th day, 3 week, and 6 weeks after diagnosis.

Results

The study group included 37 patients who were diagnosed and treated. 56.76% of patients had sudden SNHL of < 72 hrs. duration, while 43.24% had sudden SNHL of >72 hrs. duration. The majority i.e. 35.14% had severe hearing loss (71–90 db) followed by 29.73% with moderate hearing loss (41–55 db). Tinnitus was noted as commonest associated symptom in 78.38% followed by tinnitus & vertigo in 21.62%. As per etiology, idiopathic cause (64.86%) was followed by acoustic trauma (24.32%) and head trauma (10.81%) in study group .In terms of recovery, 35.14% patients had complete recovery while 40.54% and 24.32% patients had partial and no recovery respectively.

Conclusion

The diagnosis of sudden SNHL is easily obtained by audiometry. Exact etiology often remains unknown so early diagnosis by avoiding unnecessary investigations and prompt treatment in <72 hrs. still carry good prognosis.

Keywords:

methylprednisolone, pure tone audiogram, sudden sensorineural hearing loss

Egypt J Otolaryngol 32:105–109

© 2016 The Egyptian Oto - Rhino - Laryngological Society
1012-5574

Introduction

Sudden sensorineural hearing loss (SNHL) is a confusing and controversial issue in our practice and is a common otological emergency. The most accepted definition is SNHL of at least 30 db or more on at least three consecutive occasions over a period of less than 3 days [1]; however, there is no well-accepted definition, method of evaluation, and treatment for the disease. Approximately 50% patients complain of associated dizziness and tinnitus. The window of opportunity is narrow and early administration of high-dose methylprednisolone is more efficacious than watchful waiting. The overall incidence is likely underestimated as many who recover quickly will never seek medical attention. A wide spectrum of etiologies including local, systemic, and retro cochlear diseases is associated with sudden SNHL, such as viral diseases, temporary breaks of the inner ear

membranes, immune-mediated reactions, and vascular sclerosis of the microcirculation in the inner ear [2], but still the ‘idiopathic unilateral’ feature of the disease is predominant. The aim of this study is to identify and define the disease at the earliest and to study the efficacy of a multidrug high-dose steroid treatment.

Materials and methods

Patients attending the ENT Department at Jawaharlal Nehru (JLN) Hospital and Research Centre, Bhilai,

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

India, during the period of August 2012 to November 2013 with a complaint of sudden SNHL were included in this study. A total of 37 patients were included. We considered a SNHL of 30 dB or more on three consecutive occasions over less than 3 days of duration as the criterion for sudden SNHL.

Those older than 18 years of age, and with mixed and conductive hearing loss (HL) were excluded.

Evaluation

A complete general systemic and ENT examination was performed. Audiometric evaluation included pure tone audiogram, impedance audiometry, and, if required, imaging. Pure tone audiometry was repeated on day 4 of treatment, and thereafter at the third and sixth week after the clinical diagnosis.

Treatment

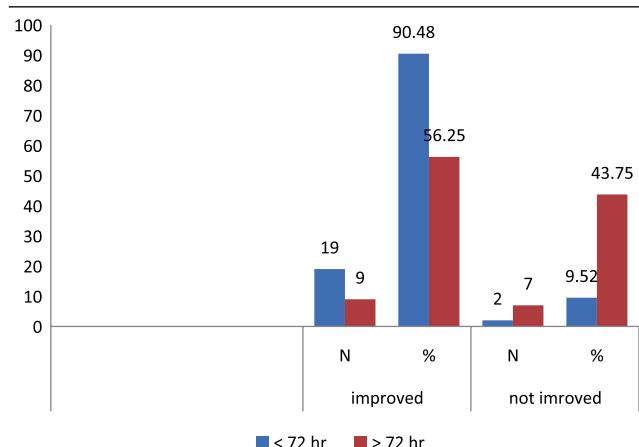
Intravenous methylprednisolone 2 g loading dose was administered on day 1, followed by 1 g twice a day for 2 days and then tab. prednisolone (1 mg/kg/day) for 5 days, gradually tapered over the next 10 days, along with tab. pentoxifylline 400 mg TDS for 14 days with an injection of methylcobalamin intramuscularly once a day for the first 3 days.

Data analysis

The following definition was used for recovery considering a normal-hearing contralateral ear as an indicator of the status of the affected ear before HL [3]:

- (1) Complete recovery (type 1) – recovery to within 10 db of contralateral ear hearing pure tone average.
- (2) Partial recovery (type 2) – recovery of hearing to within 50% or more of contralateral ear pure tone average.

Graph 1



Relation between duration of onset and recovery

- (3) No recovery (type 3) – less than 50% recovery of hearing.

Statistical methods

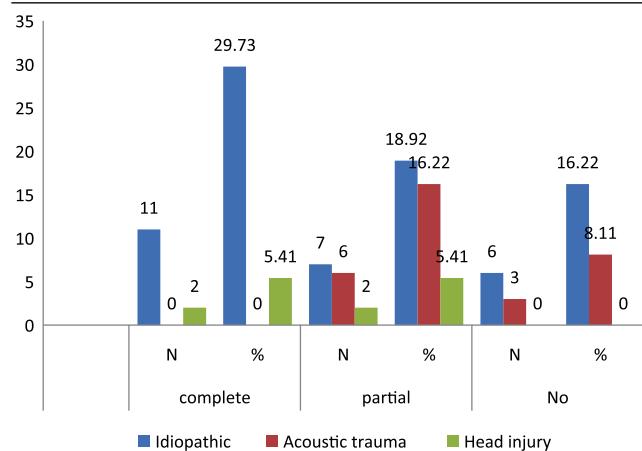
Statistical analysis was carried out using mean and SD, and χ^2 analysis was carried out to determine a statistically significant relation. The level of significance was set at P value less than 0.05.

Results

A prospective study of 37 cases of sudden SNHL in the greater than 18 years age group was carried out at the ENT Department, Jawaharlal Nehru Hospital and Research Centre, Bhilai, over a period of 15 months from August 2012 to November 2013 and the following results were obtained:

- (1) Among patients who presented with symptoms of sudden SNHL in less than 72 h, 52.38% patients experienced complete recovery, whereas 38.10 and 9.52% showed partial and no recovery, respectively. Among those who presented beyond 72 h of onset, 12.5% experienced complete recovery, whereas 43.75 and 43.75% of patients achieved partial and no recovery of hearing (Graph 1).
- (2) In this study, of 24 patients with idiopathic sudden SNHL, 11 patients achieved complete recovery, whereas seven and six patients achieved partial and no recovery, respectively. Of nine patients with acoustic trauma-associated sudden SNHL, six and three patients achieved partial and no recovery, whereas none achieved complete recovery. Of four patients with head injury-associated sudden SNHL, two patients each achieved complete and partial recovery (Graph 2).

Graph 2



Relation between etiology of HL (hearing loss) and recovery

- (3) In this study, among patients with mild HL ($N=2$), both achieved complete recovery of hearing. In moderate HL ($n = 11$), six patients (16.22%) and five patients (13.51%) achieved complete and partial recovery, respectively, whereas none had no recovery. In moderately severe HL ($N = 9$), four patients (10.81%) and five patients (13.51%) achieved complete and partial recovery, whereas none had no recovery. In severe HL ($n = 13$), 2.7% achieved complete recovery, whereas 13.51 and 18.92% achieved partial and no recovery of hearing, respectively. In the profound HL category ($n = 2$), recovery was nil (Graph 3).
- (4) In the study group, nine patients underwent a flat audiogram and the remaining 28 patients underwent a down-sloping audiogram. In the flat audiogram category, three (8.11%) and six (16.21%) patients achieved partial and no recovery, whereas in the down-sloping audiogram category, 13 (35.41%), 12 (32.43%), and three (8.11%) patients achieved complete, partial, and no recovery, respectively (Graph 4).
- (5) In the study group, 34 patients had type A and three patients had type A/As tympanogram distributed among various categories of HL at the initial evaluation. Following treatment at the end of follow-up after 6 weeks, 36 patients had type A and one patient had a type A/As tympanogram (Table 1). Thus, no significant change was observed after treatment and no correlation could be established between severity/recovery in HL.
- (6) In a group of 37 patients, 29 patients only had associated tinnitus, of whom 13 (35.14%) achieved complete recovery, whereas the rest of the 13 patients (35.14%) and three patients (8.11%) achieved partial and no recovery. The rest of the eight patients had both tinnitus and

vertigo, out whom two patients (5.41%) and six patients (16.22%) achieved partial and no recovery (Graph 5).

- (7) In the study group, six patients had associated diabetes mellitus type 2, of whom four (10.81%) and two (5.41%) achieved partial and no recovery. There was only one patient with associated hypertension who achieved partial recovery. Six patients had associated diabetes mellitus and hypertension, of whom two (5.41%) and four (10.81%) patients achieved partial and no recovery. Thus, none of the patients with associated comorbidity achieved complete recovery (Graph 6).

Discussion

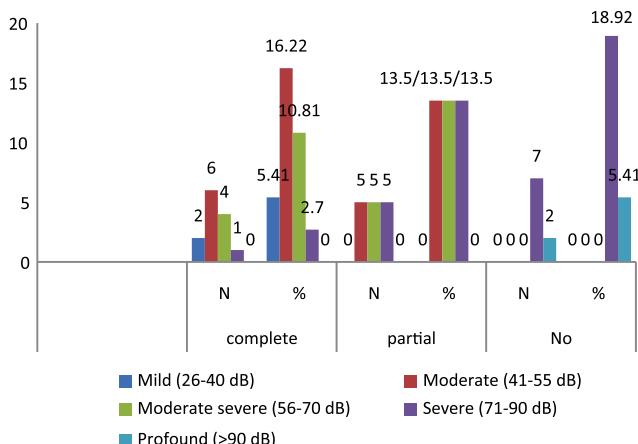
Sudden SNHL is a common otological emergency. A surprisingly high number of patients report that they notice HL immediately on awakening, suggesting that HL occurred during sleep. Our study showed that most of the patients (idiopathic cause) developed HL on awakening from sleep.

According to Byl (1984) [4], the average age of onset is reported to be 46–49 years, with increasing incidence with age. According to Charles W [5], any age group can be affected and the peak incidence appears to be in the sixth decade of life. Our study showed that most of

Table 1 Distribution pattern of various tympanograms among patients

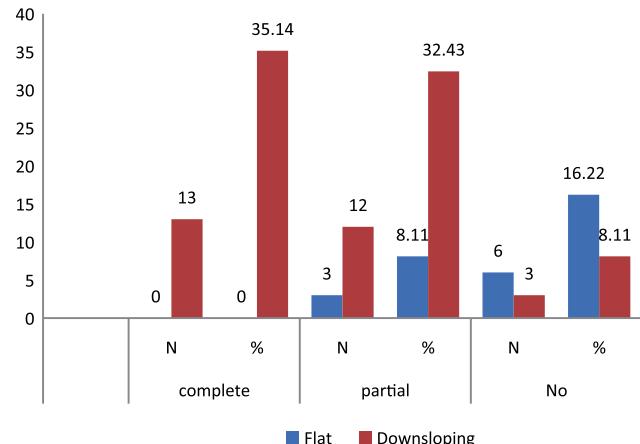
Tympanogram	Mild loss	Moderate loss	M. Severe loss	Severe loss	Profound loss
Type A	2	10	9	13	1
Type A/As	–	1	1	–	1
At 6 weeks f/u					
Type A	2	10	9	13	2
Type A/As	–	1	–	–	–

Graph 3

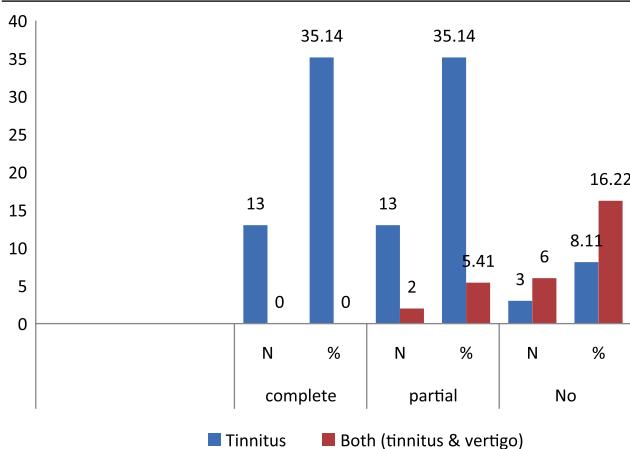


Relation between severity of hearing loss and recovery

Graph 4



Relation between type of audiogram and recovery

Graph 5

Relation between associated tinnitus and vertigo with recovery

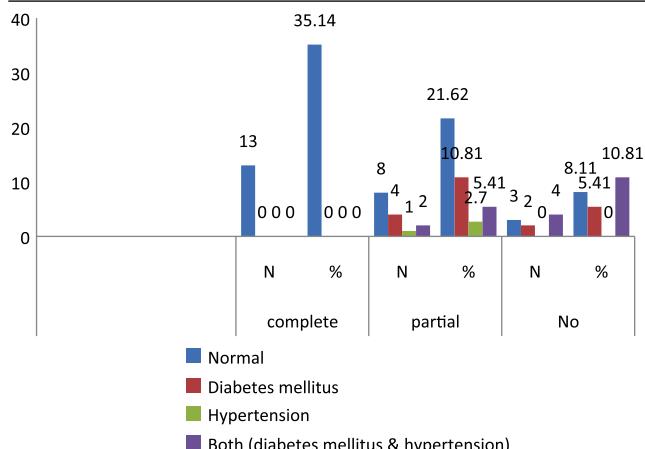
the patients ranged in age from 40 to 60 years (mean age 54.46 years).

Most of the patients do not seek advice immediately at the onset of symptom and typical presentation is generally delayed by 48–96 h [6]. Vijayendra *et al.* [7] studied 34 patients with idiopathic SSNHL, of whom 18 patients presented within 3 days. In our study, 21 out of 37 patients presented within 3 days. Delay in presentation and thus in starting treatment is a negative prognostic factor as concluded by Bullo *et al.* [8]. In our study, poor recovery was observed in those who presented beyond 72 h (Graph 1).

Tinnitus is a common associated symptom in SSHL. According to Cvorovic and colleagues, tinnitus has been considered a positive prognostic factor for hearing recovery. In our study, 29 out of 37 patients had associated tinnitus [9]. Of these, 35.14% achieved complete and partial recovery each, whereas 8.11% achieved no recovery.

According to Nakashima *et al.* [10], the association of vertigo has the worst prognosis. Pajor *et al.* [11] found a recovery rate of 51% for SSNHL without vertigo, whereas a recovery rate of only 33% was found for those with vertigo. In our study, none of the patients with vertigo achieved complete recovery; 5.14 and 16.22% of patients who had associated vertigo achieved partial and no recovery, respectively.

The shape of the audiogram was related to recovery and patients with a low-frequency or a mid-frequency audiogram contour showed better recovery [12]. In our study, we found that a flat audiogram had the worst prognosis for recovery than a down-sloping audiogram. Among 24.32% of patients with a flat audiogram, 16.21 and 8.11% achieved no and partial recovery, respectively.

Graph 6

Relation between associated medical co-morbidities and recovery

In our study, severe SNHL at presentation was found to be a poor prognostic factor for recovery. In all, 35.14% of patients with severe SNHL achieved complete and partial recovery, 2.7 and 13.51% patients, respectively, whereas the majority, 18.92%, achieved no recovery. Vijayendra *et al.* [7] and Bullo *et al.* [8] studied and found that more severe HL was a poor prognostic factor.

Common systemic diseases such as diabetes mellitus and hypertension may affect recovery in patients because of associated microangiopathy [13]. Hirano *et al.* [14] reported that patients with diabetes mellitus, hypertension, and hyperlipidemia had a poor prognosis. Similarly, Lin *et al.* [15] concluded that patients with diabetes mellitus, coronary artery disease, and retinopathy had an increased risk of developing SSNHL. In a study carried out by Bullo *et al.* [8], the presence of co-morbidities in the sample did not influence the final recovery negatively. In our study, patients with diabetes mellitus, hypertension, or both experienced more severe HL, along with partial or no recovery, and thus a poor prognosis (Graph 6).

The role of imaging is still not well defined in SSNHL workup as it does not seem to affect treatment much; however, to label SSNHL as idiopathic, MRI is essential to rule out vestibular Schwannoma as it is found in about 2% of SSNHL and has been associated with partial recovery [16]. In our study, no such retrocochlear pathology was found, although in those with head injury (10.81%), computed tomography scan of the head indicated extradural hemorrhage.

In most of the cases of SSNHL, it may not be possible to arrive at a particular diagnosis. However, the assessment of all possible mechanisms leading to SSNHL should still be performed to find out approximate 10% of cases for which one can arrive at

an identifiable and hopefully treatable diagnosis [16]. In our case series, an idiopathic cause (64.86%) was followed by acoustic trauma (24.32%) and head injury (10.81%). Complete recovery was most common even in an idiopathic etiology (29.73%), followed by acoustic trauma and head injury (5.41%), whereas no recovery was observed in 50% of patients with head injury, followed by acoustic trauma (33.3%) and the idiopathic group (25%).

Conclusion

The diagnosis of SSNHL should be prompt. Unnecessary, nontargeted tests should be avoided and MRI should be considered in all cases with idiopathic SSNHL, irrespective of recovery. Treatment protocol, that is, combination regimens (high-dose methylprednisolone, pentoxifylline, and vitamin B₁₂) is highly recommended in view of good recovery in 75% of cases. Associated symptoms such as vertigo and comorbidities such as diabetes mellitus and hypertension, along with a flat audiogram, are poor prognostic factors in hearing recovery.

As SSNHL can have a severe impact on quality of life, long-term follow-up is required (>6 months) to identify early morbidities and to initiate a rehabilitation program as early as possible.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- 1 National Institute of Health. Sudden deafness. Bethesda: National Institutes of Health, 2000. NIH publication 00-4757. Available at: <http://www.nidcd.nih.gov/health/hearing/sudden.asp>. [Last Accessed on 2009 May 19].
- 2 Nagaoka J, Anjos MF, Takata TT, Chaim RM, Barros F, Penido Nde O. Idiopathic sudden sensorineural hearing loss: evolution in the presence of hypertension, diabetes mellitus and dyslipidemias. *Braz J Otorhinolaryngol* 2010; 76:363–369.
- 3 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; 106:772–776.
- 4 Byl FM Jr. Sudden hearing loss: eight years experience and suggested prognostic table. *Laryngoscope* 1984; 94:647–661.
- 5 Charles W. *Cummings otolaryngology head & neck surgery*. 4th ed. Philadelphia: Elsevier; 2005. 3554.
- 6 O'Malley MR Hayens DS. Sudden hearing loss. *Otolaryngology Clin North Am* 2008; 41:633–649.
- 7 Vijayendra H, Buggaveeti G, Parikh B, Sangitha R. Sudden sensorineural hearing loss: an otologic emergency. *Indian J Otolaryngol Head Neck Surg* 2012; 64:1–4.
- 8 Bullo F, Tzamtzis S, Tirelli G. Update on the sudden hearing loss. *Indian J Otol* 2013; 19:95–99.
- 9 Cvorovic L, Deric D, Probst R, Hegemann S. Prognosticmodel for predicting hearing recovery in idiopathic sudden sensorineural hearing loss. *Otol Neurotol* 2008; 29:464–469.
- 10 Nakashima T, Tanabe T, Yanagita N, Wakai K, Ohno Y. Risk factors for sudden deafness: a case control study. *Auris Nasus Larynx*.1997; 24:265–270.
- 11 Pajor A, Durko T, Gryczynski M. Predictive value of factors influencing recovery from sudden sensorineural hearing loss. *Int Congress Series* 2003; 1240:287–290.
- 12 Mattox DE, Lyles CA. Idiopathic sudden sensorineural hearing loss. *Am J Otol* 1989; 10:242–247.
- 13 Plaza G, Durio E, Herreira C, Rivera T, Garcia-Berrocal JR, Asociación Madrileña de ORL Consensus on diagnosis and treatment of sudden hearing loss. *Acta Otorrinolaringol Esp* 2011; 62:144–157.
- 14 Hirano K, Ikeda K, Kawase T, et al. Prognosis of sudden deafness with special reference to risk factors of microvascular pathology. *Auris Nasus Larynx* 1999; 26:111–115.
- 15 Li Lin SW, Lin YS, Weng SF, Chou CW. Risk of developing sudden sensorineural hearing loss in diabetic patients: a population based cohort study. *Otol Neurotol* 2012; 33:1482–1488.
- 16 Fetterman BL, Saunders JE, Luxford WM. Prognosis and treatment of sudden sensorineural hearing loss. *Am J Otol* 1996; 17:529–536.