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SUDDEN SENSORINEURAL HEARING LOSS: CLINICAL CHARACTERIZATION OF PATIENTS

Aims & Objective:

To study the clinical profile & prognostic factors in patients with sudden sensorineural hearing loss

Material and Methods:

A retrospective study was carried out from patients of sudden sensorineural hearing loss (SSNHL) presenting to ENT department of T.U. Teaching hospital, a tertiary referral center of Nepal from April 2006 to June 2012. All patients were given intravenous steroids as treatment modality for 14 days and pure tone audiogram was done every 3 days during hospital admission. It was followed by oral steroids in tapering dose for further 14 days. After 1 month, audiogram was done again. After 1 month if hearing threshold was decreased by more than 50% of presenting one, then it was labeled as improved.

Results:

Total 85 patients (87 ears) with age ranging from 6-77 years (average- 41.3 years) were included. Three fourth were male. Presentation was 1-14 days after onset of hearing loss (average- 3.7 days) with pure tone audiogram (PTA) of 38-117 dB (average 83.1 dB). The flat audiogram (62.3%) was most common type. Smoking was present in 32 patients and tinnitus in 58 ears. Haemoglobin ranged from 7.3-18.7 gm % (average- 15.3 gm/dl). PTA post treatment was 8-73 dB (average- 56 dB). Average age of improved patient was 39.8 years which was lower than non-improved patients (42.3 years). In improved patients, average PTA at presentation was 77.9 dB while it was 86.6 dB in non improved patients.

Conclusion:

SSNHL is more commonly seen in male patients with polycythaemia and is commonly presented in winter season and is frequently associated with tinnitus. Young age and lower audiogram threshold at presentation favour prognosis.

Key words: Sudden Sensorineural Hearing Loss, Pure tone audiogram, Steroids.

INTRODUCTION:

Sudden sensorineural hearing loss (SSNHL) is an otological emergency. Idiopathic sudden sensorineural hearing loss remains a controversial problem with respect to its etiology and the prognostic factors.^{1, 2} There are lots of things needed to sort out about this important disease. Lack of a universally accepted definition of sudden sensorineural hearing loss, insufficient knowledge of pathogenesis, lack of a standard method for evaluating the patients in addition to a high spontaneous recovery rate all complicate the study of sensorineural hearing loss and the investigation of different treatment modalities.^{3, 4, 5}

It is easier to recognize than to define. In fact there are various definitions for this disease. Widely accepted definition is "30 dB sensorineural loss in 3 contiguous frequencies in <3 days" given by Wilson et al in 1980. The vast majority of cases are unilateral and the estimated annual incidence is 20 per 100 000 persons.⁶ We don't have incidence rate from Nepalese population but it is frequently encountered entity in hospitals of Nepal.

Regarding its etiopathogenesis exact cause is not known in most of the cases making "idiopathic" (ISSNHL) as usual prefix in diagnosis. However known local and systemic causes that can result SSNHL are always looked upon. Impaired cochlear blood circulation has been suggested to cause sudden hearing loss.^{7, 8} But the lack of clear relationships between SSNHL and other vascular risk factors suggests multifactorial disease profile.^{8, 9} There is lack of high quality evidence on the effectiveness of any specific treatment. Hence there are numerous drugs and therapies as options to use in ISSNHL. Example: steroid, antioxidant, vasodilators, plasma expanders, anti-coagulants, and carbogen inhalations, etc. Treatment outcome is measured by Wilson's criteria.¹⁰ According to this criteria if threshold is <10 dB it is labeled as "complete recovery". If threshold improves by 50% of initial threshold it is labeled "partial recovery". If improvement is <50%, then it is called "no recovery". Approximately 50% of patient experience complete recovery in most of literatures

Factors governing prognosis has been defined but weightage of those factors in context of patients of Nepal is not known well. Only 1 paper has been published regarding this topic from Nepal so far by Nepal et al in 2007 (n=46).¹¹ It was a prospective study of 3 years duration (2002-2005). It is very difficult to predict recovery in sudden sensorineural hearing loss (SSNHL) though a number of speculations

and hypothesis are given regarding the factors affecting disease course. Some factors have been well established regarding prognostic implications. But what is the scenario of those factors in Nepal is not well established. A study over longer duration and more number of patients is required. Hence this study was designed to study the clinical profile of patients with sudden sensorineural hearing loss so that possible prognostic factors in Nepalese population can be known.

MATERIALS AND METHODS:

A retrospective study was carried out from patients of sudden sensorineural hearing loss presenting to ENT department of T.U. Teaching hospital, a tertiary referral center of Nepal from April 2006 to March 2012. Records of patient with SSNHL fulfilling Wilson's criteria and who were admitted in hospital for intravenous steroid therapy were studied. Their age, sex, occupation, duration of illness, side involved and date of admission were recorded. The associated complaints like tinnitus, vertigo, history of smoking was recorded and they underwent thorough systemic and ENT examinations. All patients underwent pure tone audiogram at the time of admission. From the audiogram pure tone average, threshold at 8 KHz and audiogram pattern were recorded. Every patients underwent investigations for haematological, biochemical (including lipid profile, thyroid function test), serological (ELISA HIV, HBsAg, HCV; RA factor, ANA, VDRL) study.

All patients were given intravenous steroids in hospital for 14 days and pure tone audiogram was done every 3 days during hospital admission. It was followed by oral steroids in tapering dose for further 14 days. After 1 month, audiogram was done again. After 1 month if hearing threshold was 50% or less than the presenting one, then it was labeled as improved.

If patients had recovery before 14 days or they wanted to take their medications at home, then equivalent prednisolone dose was given and called for follow up after 1 month of illness. Patients with incomplete records and patients who denied steroid treatment before recovery were excluded. Improvement percentage was calculated. Comparison between patients with >50% improvement and those with less than that was done. Data were analyzed using SPSS 17.0 software

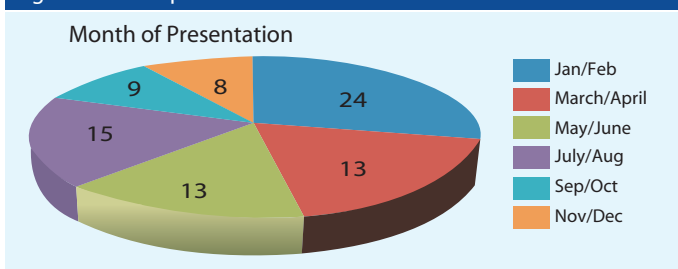
Tab. 1: Occupations of patients presented with SSNHL

| Occupation | Number of patients |
|----------------|--------------------|
| Business | 22 |
| Service | 21 |
| Student | 12 |
| Housewife | 11 |
| Teacher | 6 |
| Retired | 4 |
| Security Guard | 3 |
| Farmer | 2 |
| Driver | 2 |
| None | 2 |

RESULTS:

Total 85 patients (87 ears) with complete records and follow up at 1 month was found and they were included. The age ranged from 6-77 years (average- 41.35 years). Three fourth were male. Presentation was 1-14days after onset of hearing loss (average- 3.72days). People with different occupation were involved. Most of them were involved in some sort of business or worked in an office. (Table 1) We also noted the month of presentation (Fig. 1) and 28.2 % presented in month of January and February. There were 48 patients who had hearing loss in right ear and 35 in left. Only 2 patients had bilateral involvement at presentation.

Fig 1: Month of presentation



Audiogram showed that pure tone average (PTA) ranged from 38dB to 117dB (average 83.16dB). While threshold for 8 KHz ranged from 20dB to 110 dB with an average of 84.3dB. The pure tone audiogram pattern was mostly flat (62.3%) involving all the frequencies. (Table 2)

Tab. 2: Audiogram pattern at presentation

| Audiogram Pattern | Number |
|-------------------|--------|
| Flat | 55 |
| Upsloping | 11 |
| Downsloping | 14 |
| Inverted V shaped | 2 |
| 'U' or 'V' shaped | 5 |

There were 32 patients with history of smoking and two patients had past history of SNHL in other ear. Recent history of Mumps was found in 3 patients. Hypothyroidism was found in 2 patients one of them was a known case and was under treatment. Out of 85 patients who underwent lab investigations 2 were having positive RA factor and one had positive HBsAg. Hypertension was present in 19 patients and 9 were diabetic. There were 31 patients with fasting blood sugar between 110 and 125mg/dl. Tinnitus was complained in 58 ears (66.6%) while only 20 patients had vertigo or dizziness. ESR ranged from 2 to 55 mm in first hour with an average of 14.97mm in first hour. Haemoglobin estimation ranged from 7.3gm/dl to 18.7gm/dl with an average of 15.36gm/dl. Forty percent of patient had haemoglobin more than 16 gm/dl. Intravenous high dose hydrocortisone therapy was taken from 3 to 14 days with an average of 9.9days. Those who didn't completed intravenous therapy were kept in equivalent prednisolone therapy. Post treatment pure tone average was 8-73dB (average- 56dB,) while for 8 KHz it was 10-110dB (average- 61dB). Average percentage of improvement in pure tone average was found to be 39.25% while only 25.4% had improvement in 8 KHz frequency.

Tab. 3: Comparing Improved patients with non improved patients

| Features | Patient with <50% improvement (n=51, ears=52) | Patients with 50% recovery (n=34, ears=35) | Total |
|--------------------------|-----------------------------------------------|--------------------------------------------|----------|
| Age | 39.8yrs | 42.38yrs | 41.35yrs |
| Duration at presentation | 3.65days | 3.76days | 3.72days |
| Tinnitus | 31 | 27 | 58 |
| Vertigo | 9 | 11 | 20 |
| Smoking | 12 | 20 | 32 |
| Hb | 15.0gm% | 15.58gm% | 15.36gm% |
| HTN | 4 | 15 | 19 |
| DM | 3 | 6 | 9 |
| Presenting PTA average | 77.94dB | 86.64dB | 83.16dB |
| Type of audiogram | | | |
| Flat | 21 | 34 | 55 |
| Upsloping | 5 | 6 | 11 |
| Downsloping | 7 | 7 | 14 |
| Inverted V shaped | 0 | 2 | 2 |
| 'U' or 'V' shaped | 3 | 2 | 5 |

The profile of patients who improved by more than 50% was compared with that of those who improved by less than 50% (Table 4). Average age of improved patient was 39.8years which was lower than non-improved patients (42.38years). In improved patients, average PTA at presentation was 77.94dB while it was 86.64dB in non improved patients. Days of presentation were almost similar in both groups. (Table 3)

DISCUSSION:

Idiopathic SSNHL being "idiopathic" is the reason of all the controversies and dilemma related to it. As the cause is not known, lot of hypotheses and speculations have been formulated regarding its etiopathogenesis. Multiple hypotheses lead to multiple mode of treatment, none of which is a well established one. Diverse clinical conditions resulting sudden hearing loss as a symptom also helps to increase this confusion. Most of the studies are retrospective as one can't predict its onset and there is no defined high prevalence region.^{2,12,13, 14, 15, 16, 17} Different authors at different times have mentioned that a well designed randomized control trial is utmost requirement.¹⁸ For carrying out such study first we need a baseline scenario of demographic profile of this disease in Nepal. Only one such study has been published from Nepal so far.¹¹ It was 3 years study unlike ours which was done for more than 6 years. Regarding good sample size; we needed a center where flow of patients for otological service is maximum and that too from different parts of country. Same institution as in Nepal et al study was chosen so that with similar settings and treatment modalities the outcome and profile can be compared. Sample size of 85 patients in 6 years was good as compared to other studies^{3, 14, 15, 19}. Average age of onset (41.3yrs) is comparable to Yimtae et al study (43.7yrs) and Cadoni, et al (45.1years). We found 75.3 % male patients unlike Yimtae et al (39.3%) and Cadoni et al (41.6%)

ISSNHL occurred in different occupations and no clear risk group was found. On an average people presented within 4 days of onset, but this doesn't represent overall behaviour of Nepalese patients as people presenting after 14 days of onset were not included. Most of the patients had the disease in winter. Bilateral presentation is less common similar to other studies as Yimtae et al (7.1%)³ and Fetterman et al (1.7%).²⁰ Bilateral simultaneous presentation was found in only 2 patients. One of them had more than 50% improvement in both ears and other had less than that in both ears. Serological positive cases were limited. It seemed to be incidental finding as clinical symptoms in other organs hadn't developed in those cases. Vascular disease risk factors were commonly associated like: smoking (32/85), hypertension (9/85) and diabetes (9/85). Though smoking was

commonly found, other studies have shown that it doesn't cause increased incidence.^{12,18} A community based case control study is required as smoking is frequent habit in Nepalese community. Diabetes is less common in this study when compared with Nepal et al study. Hypertension proportion is similar to other studies.⁹ It was interesting finding that most of the patients had high haemoglobin level; around 40% had hemoglobin level more than 16gm/dl. This indicates polycythaemia may be having role in etiopathogenesis and justifies use of pentoxifylline. Tinnitus was a common aural complaint in Nepalese population unlike in study of Psifidis et al.¹³ Twenty patients complained of some form of dizziness.

More recent studies applying treatment protocols including vasodilators, plasma expanders, anti-coagulants, and carbogen inhalations have shown no improvement over the rate of spontaneous recovery without therapy.²¹ Except in cases of therapy directed toward known predisposing factors, there is insufficient evidence in the literature to support medical treatment for SNHL, although steroid therapy appears to be useful in selected patients. Steroid therapy is most preferred method in treatment of this entity.²² Though the hospital protocol was to give high dose steroid in tapering dose for 14 days; it was not fulfilled in some cases. Some cases deferred injectable medication and hospital stay and they were discharged with equivalent prednisolone dose. Some cases had rapid improvement and were switched to oral medication when average threshold went below 30dB. Many drugs have been given for SSNHL in different literature, but we focused on high dose steroid only. It is started as early as possible under supervision for possible adverse effects. Steroids are thought to help by decreasing edema over 8th nerve that can be a result of viral infection, ischaemia or other inflammation.

Improvement proportion of patient was 40.2% which is similar to other studies.¹⁶ However few studies showed high proportion of improvement which may be due to different definition of improvement.^{3,11,15,23} The improvement proportion increases with time²⁴ but follow up after 1 month was not documented in most of the cases. Comparing patients with 50% recovery with less than that revealed that average age of onset was slightly less in recovered group. Hypertension was found in more number of patients who didn't recover well. Vertigo is labeled as poor prognostic factor by many authors^{12,13,14,16,19} but we found almost similar proportion in both groups. There were marginally more patients with tinnitus in improved group of patient which is correlating with other studies.^{14,19} Presenting audiogram average was less in improved group. Though downsloping audiogram is adverse factor for good outcome^{2,4,19,25,26,27} but in our case such pattern was equally common. The study being a secondary data analysis and having objective of evaluating the profile of such patients, statistical tests were not applied. Few studies have shown clinical treatment within the first seven days was the only statistically significantly in patients who improved hearing.²⁸ This is correlated in our study as well because average time of onset of start of medication is early in improved groups.

CONCLUSION:

SSNHL is more commonly seen in male patients with polycythaemia and is commonly presented in winter season and is frequently associated with tinnitus. Young age and lower audiogram threshold at presentation favour prognosis. Further studies are needed to obtain better knowledge about the etiopathogenesis of SSNHL. So that new therapeutic strategies can be considered in the treatment of this challenging ear disease. But early start of treatment is must in SSNHL as outcome improves with early treatment. Awareness should be spread among health practitioner and general population about urgent need of its treatment.

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