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SUDDEN SENSORINEURAL HEARING LOSS: AN INSTITUTIONAL EXPERIENCE

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ABSTRACT Sudden sensorineural hearing loss (SSNHL) is a medical emergency and has been defined as an idiopathic sudden sensorineural hearing loss of unknown etiology, exceeding 30 dB, occurring in at least 3 neighboring frequencies and appearing abruptly within a period of 72 hours.
The incidence rate is 5-30/100000 per year, affecting mainly younger patients, and this is a cause of concern.
Only about 10 to 15% are due to other identifiable causes, such as Meniere's disease, trauma, autoimmune disease, syphilis, Lyme disease, or perilymphatic fistula.
88% are found to be idiopathic.
Spontaneous recovery is variably reported to occur in up to 65% of patients who have idiopathic SSNHL.
Although different treatment modalities have been tried, no standard management protocol exists.
We discuss the clinical profile and treatment outcomes of 23 consecutive cases of SSNHL that were managed in our center from May 2015 to Dec 2017.

KEYWORDS : sudden sensorineural hearing loss; intratympanic steroids

INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is a medical emergency and has been defined in various terms, the most common being an idiopathic sudden sensorineural hearing loss of unknown etiology, exceeding 30 dB, occurring in at least 3 neighboring frequencies and appearing abruptly within a period of 72 hours [1]

The incidence rate is 5-30 cases /100000 per year, affecting mainly younger patients, and this is a cause of concern [2].

Approximately 1% of cases of sudden sensorineural hearing loss are due to "retro-cochlear" disorders that may be related to vestibular schwannoma, demyelinating disease, or stroke.

Another 10 to 15% are due to other identifiable causes, such as Meniere's disease, trauma, autoimmune disease, syphilis, Lyme disease, or perilymphatic fistula[3].

88% are found to be idiopathic[4].

Spontaneous recovery is variably reported to occur in up to 65% of patients who have idiopathic SSNHL [5].

Although different treatment modalities have been tried, no standard protocol exists.

MATERIAL AND METHODS

A retrospective study of 23 consecutive patients who presented to this center from May 2015 to Dec 2017 was carried out.

Hospital records were reviewed for each patient with regard to etiology, clinical evaluation, treatment received, and outcomes.

Information was obtained from hospital records and follow-up by direct patient contact.

Multimodality treatment was given for most of the patients, and the results evaluated with Pure Tone Audiometry (PTA).
Inclusion criteria for the initial treatment were:

- Sensorineural hearing loss of sudden onset (less than 72 hours),
- Age 15-70 years,
- PTA > 30dBHL.

Exclusion Criteria

- Identifiable causes of hearing loss like middle ear disease, trauma, infections etc
- Prior ear surgery.

Detailed history about the hearing loss was taken, which included

- time of onset
- duration
- unilateral or bilateral
- fluctuating or constant,
- presence of associated symptoms like vertigo, tinnitus;
- history of noise exposure
- ear infections
- upper respiratory tract infections
- use of ototoxic drugs like aminoglycosides, loop diuretics, chemotherapeutic agents
- history of trauma
- neurological deficits associated with the hearing loss

All patients underwent detailed evaluation as per standardized protocol:

- Otoscopy to exclude middle ear disease, perforated tympanic membrane.
- Rinne, Weber and Absolute Bone Conduction Tests
- In patients with history of giddiness, concomitant vestibular dysfunction was evaluated by vestibular function tests which included Spontaneous Nystagmus, Dix Hallpike, Unterberger Test, and Head Shake Test.
- Cerebellar function tests like Finger Nose Test, Diadochokinesia, examination of Gait and Rhombergs Test to check the posterior column were recorded.
- Cranial nerves examination was carried out.
- Blood tests: complete blood count, blood sugar, lipid profile, thyroid function tests.
- All patients underwent imaging either with MRI brain with contrast or contrast CT scan of temporal bone based on clinical suspicion.

23 cases in which there was no etiology for the hearing loss evident, and no organic lesions detected on imaging, were included in our study.

The patient characteristics and initial treatment received are shown in [Table 1]

Table 1: Patient characteristics and Treatment Groups

	Initial Multimodality **Group A**	Initial Systemic Steroids **Group B**	No Treatment **Group C**
Total	14	5	4
Age (years)			
<20 (4)	2	-	2
20-40 (5)	3	2	-
40-60 (11)	6	3	2
60-70 (3)	3	-	-
Gender			
Male (13)	9	3	1
Female (10)	5	2	3
Ear			
Right (11)	7	2	2
Left (10)	5	3	2
Bilateral (2)	2	-	-
Time from onset			
<1 week (14)	8	4	2
1 week – 1month (5)	4	-	1
>1 month (4)	2	1	1
Other symptoms			
Tinnitus (13)	8	3	2
Vertigo (10)	6	2	2

There were 23 patients, 13 (56.5%) were males and 10 (43.47%) were females.

11 (47.82%) of patients were between the age group of 40-60 years, 5 (21.73%) were between 20-40 years. 4 (17.39 %) were less than 20 years and 3 (13.04%) were between 60-70 years.

In 11 (48%) patients, the right ear was affected, in 10 (43%) patients the left ear was affected, and 2 (9%) patients had bilateral involvement.

Treatment strategy was based on clinical evaluation and judgement.

- Group A was treated with a multimodality regimen including
- Low molecular weight Dextran injection in 500 ml normal saline over 12 hours for 3 consecutive days
- Intravenous methylprednisolone 15-20 mg/kg/day for 5 days
- Oral prednisolone thereafter 1mg/kg/day in tapering doses
- Tab Acyclovir 800 mg 1-1-1-1-1 for 5 days
- Tab Pentoxifylline 400 mg 1-0-1
- Group B received treatment with systemic steroids in the form of

Prednisolone oral
60 mg/day for 07 days
40 mg/day for 3 days
20 mg/day for 2 days
10 mg/day for 2 days

Dexamethasone oral
10 mg/day for 7 days
6 mg/day for 3 days
4 mg/day for 2 days
2 mg/day for 2 days

- Group C did not receive any treatment due to multiple limiting comorbidities.
- Salvage intratympanic methylprednisolone (40 mg/ml) therapy performed under microscope with patient recumbent: 0.4- 0.5 ml [with 0.2 ml of sodium bicarbonate to obtain a less acid solution injected at the postero-inferior quadrant of tympanic membrane25 gauge spinal needle] for a total of 5 injections, one every two days.

RESULTS:
The treatment modality given and outcomes are shown in Table 2.

Table 2: Treatment Modality and Outcomes

	Initial Multimodality **Group A**	***Number improved***	Initial Systemic Steroids **Group B**	***Number improved***	No Treatment **Group C**	***Number improved***
Total	14	**9**	5	**3**	4	**2**
Age (years)						
<20 (4)	2	2	-	-	2	1
20-40 (5)	3	2	2	2	-	-
40-60 (11)	6	3	3	1	2	1
60-70 (3)	3	2	-	-	-	-
Gender						
Male (13)	9	5	3	1	1	1
Female (10)	5	4	2	2	3	1
Ear						
Right (11)	7	6	2	2	2	1
Left (10)	5	3	3	1	2	1
Bilateral (2)	2	-	-	-	-	-
Time from onset						
<1 week (14)	8	5	4	3	2	1
1 week-1month (5)	4	3	-	-	1	1
>1 month (4)	2	1	1	-	1	-
Other symptoms						
Tinnitus (13)	8	4	3	1	2	2
Vertigo (10)	6	5	2	2	2	-

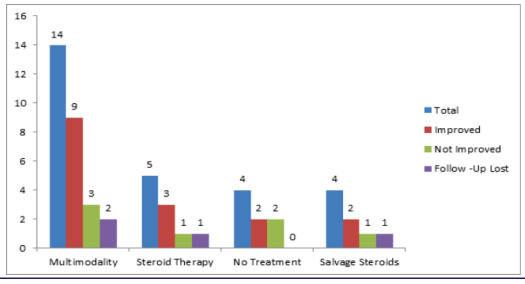
Out of 14 patients who were treated with multimodality approach, 9 patients (64.28%) showed improvement, and out of 5 patients who were treated with only systemic steroids, 3 patients (60%) showed improvement. 3 patients were lost to follow up after initial therapy.

Out of 4 patients who did not receive any treatment due to various comorbidities, 2 patients (50%) showed improvement.

The 4 intent-to-treat cases who did not improve received salvage therapy with intratympanic steroids, out of which 2 patients (50%) showed improvement.

Fig 1 shows summary of treatment modality offered and outcomes in the 23 cases.

Fig 1: Summary of Treatment Modality and Outcome



14 patients presented to us within one week of onset of the hearing loss, out of which 9 patients (64.28%) showed improvement; 5 patients presented within one month of onset, out of which 4 patients (60%) showed improvement and in the 4 patients who presented after a month, 1 patient (25%) improved.

DISCUSSION

Sudden sensorineural hearing loss is an ENT emergency that needs to be treated promptly and efficiently.
Its incidence has been estimated as 5–20/10,000 individuals per year [2, 6].

Although the exact etiology of SSNHL is still debated (such that it is classified as idiopathic), viral infections, immunological diseases, and impairment of the vascular microcirculation have been suggested as possible causes [7].

Approximately 1–6% of patients with SSNHL show a Vestibular Schwannoma on Magnetic Resonance Imaging (MRI), which is the most common pathological finding in SSNHL with inner ear lesions [8].

Recently, studies have shown that abnormal serum lipid levels and thyroid dysfunction were also significantly associated with the occurrence and prognosis of SSNHL [9, 10].

The miR183 family (miR-96, miR-182, and miR-183) is implicated in the differentiation and function of the mechano-sensory hair cells in the vertebrate inner ear and several studies have reported that mutations in the gene *miRNA96* is associated with progressive hearing loss, proving the regulatory role of this miRNA in maintaining the normal function of hair cells [11, 12].

Due to the fact that idiopathic sudden sensorineural hearing loss has a multifactorial etiology such as viral infections, vascular insufficiency, immune responses, or transient inner ear membrane breaks, various other modalities of treatment have also been tried, such as oral, intravenous and intra-tympanic corticosteroids, vasodilators, antiviral drugs and hyperbaric oxygen [13].

The definition of the true therapeutic intervention on hearing improvement is difficult to determine because of the natural history of SSHL includes a high rate of spontaneous recovery ranging from 31% to 89% [4].

The known standard treatment is systemic steroids as proved in various studies.

A recovery rate of 61% was reported by Wilson et al., 1980 [14].

Intra-tympanic injection of the steroids is increasingly being used as a treatment modality, leading to a higher concentration of corticosteroids in the perilymph fluid [15].

The therapeutic effect in this modality is attributed to the cross-over of the steroid into the round window leading to a local mode of action within the cochlea and consequently diminished systemic side effects of steroid therapy.

Since the cochlea is affected locally, the patient does not suffer the harmful side effects of systemic steroids, and therefore this type of therapy is more accepted nowadays In our study, the use of systemic steroids alone was found to be as efficient as a multimodality approach. There was no perceived difference between the groups regarding age, gender, or affected side.

In a study by Belhassen and Saliba, a significant improvement was found in patients with moderate to severe hearing loss compared to profound hearing loss on treatment with salvage intratympanic steroids [16].

However, in this study no such significant difference was found.

As intratympanic steroids were used only as a salvage therapy and not as a primary therapy, further studies are required to validate its use as primary therapy.

Studies comparing the efficacy of methylprednisolone and dexamethasone have shown an improvement rate of 67% versus 39% respectively with methylprednisolone [17, 18].

Delay in the initiation of treatment due to various factors significantly affected the outcome.

Radiological imaging, though not contributory to the diagnosis, is essential in the management to screen for treatable etiology.

CONCLUSION

Prompt recognition of SSNHL is important to establish early diagnosis and initiation of therapy.

Although some patients with SSNHL will experience full or partial recovery, it varies with severity at presentation.

Those with mild hearing loss usually achieve full recovery.

Spontaneous improvement or full recovery is unlikely in those with profound hearing loss.

Newer modalities of treatment such as intratympanic steroids and hyperbaric oxygen therapy require further evaluation before becoming standard of care.

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