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Short Communication

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Sudden Sensorineural Hearing Loss

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ABSTRACT

The aim of the present study was to verify the efficacy and the safety of intratympanic dexamethasone as salvage therapy to treat sudden sensorineural hearing loss and discuss the correlation between outcomes of SSNHL with: patient's age, time to onset of disease and therapy, severity of HL presence of vertigo, diabetes. Prospective study of 7 patients with unilateral sensorineural hearing loss that developed within 72 hr and presenting for 30 days of onset with no evidence of any other identifiable etiology for sudden HL. In our study group after inclusion and exclusion 7 patients were available for study. There were six male (86%) and one female (14%), the mean age of the patients was 53 years with a range from 32 to 67 years of age. Hearing improvement was occur in (57%) four patients, one had a complete hearing improvement, while three of them represented partial hearing improvement, under 60 years of age the recovery rate (RR) were 66.6% compared with RR 50% in patient with 60 years of age or older. RR was with losses greater than 90 dB RR (8.3%) compared with losses that were less than or equal to 90 dB (35.7%). We conclude that, an application of ITDI significantly improves the recovery outcomes in SSNHL, while the older age, sever hearing loss, associated with poorer recovery rate, on other hand presences of DM or vertigo does not significantly change the recovery rate.

Keywords - *Sudden sensorineural hearing loss; Intratympanic dexamethasone injecton; Recovery rate.*

INTRODUCTION

Idiopathic Sudden Sensorineural Hearing Loss (ISSNHL) commonly defined as greater than 30 dB of unilateral hearing loss in at least 3 contiguous frequencies occurring within 3 days. The potential causes of SSHL are varied consequently; idiopathic sudden sensorineural hearing loss remains a diagnosis of exclusion.[1,2]

Untreated SSHL has a spontaneous recovery rate of 32 to 65%.[1-5] Although the most accepted therapy in the SSNHL was a high-dose of systemic steroid with a taper, a significant limitation of this regime was a high rate of systemic complication and a poor drug penetration due to the presence of blood–inner ear barrier.[6]

A recent publications suggest that intratympanic dexamethasone therapy may improve hearing recovery as it aimed to direct deliver an optimized (maximum) dosage of a given pharmacological agent and reducing the risk of developing systemic side-effect, on contrary the risk of acute labyrinthine failure as result of minor trauma during this procedure, in addition to possibility to drug loss down through eustacian tube can not be ignored.[6]

Objectives: We describe our experience with sudden sensorineural hearing loss in aiming to:

discuss the correlation between outcomes of SSNHL with the following factors acting as the variables: patient's sex, age, time to onset of disease and therapy, presence of diabetes, severity of HL, and presence of associated otological symptoms (tinnitus vertigo);

compare the effectiveness of systemic corticosteroids vsintratympanic steroid in treatment of sudden sensorineural hearing loss to determine overall success, morbidity, and prognosis.

Hypothesis: Intratympanic steroids have minimal morbidity and the potential to have a positive effect on hearing recovery in patients with sudden SNHL who have failed systemic therapy.[1]

MATERIALS AND METHODS

Study design: Prospective study.

Study setting: Department of Otolaryngology-Head and Neck Surgery at Tripoli Medical Center (tertiary referral central) between 2012 to 2013.

Study population: Patients with unilateral sensorineural hearing loss that developed within 72 hr and presenting for 30 days or less of onset with no evidence of Ménière's disease, trauma , acoustic injury, radiation-induced HL, retrocochlear disease, autoimmune HL, and fluctuating HL, or any other identifiable etiology for sudden HL.

Interventions: All patients were evaluated using standardized methods including medical and otologic history and extensive physical examination, biochemical blood analyses, serological tests, MRI had been performed to rule-out structural or retrocochlear pathology, such as vestibular schwannoma, stroke, or demyelinating disease, and routine audiological evaluation was carried out in standard sound proof booths by certified audiologists.

All of them received a standard course of systemic IV corticosteroids while Dexamethasone 1.3 mg was injected transtympanically in patients who failed systemic therapy

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and procedure was performed on 3 to 5 separate occasions on alternate day, the hearing was assessed immediately before every injection and the following day after injection. Hearing improvement was defined as more than 10 dB in pure-tone average (PTA).

Main outcome measures: Pre-treatment and post-treatment audiometric evaluation of pure-tone average (PTA) at 500, 1000, and 2000 Hz. (by certified audiologists) was obtained.

RESULTS

In our study group after inclusion and exclusion 7 patients were available for study. There were six (86%) male) and one (14%) female (Table 1), the mean age of the patients was 53 years with a range from 32 to 67 years of age. All patients had tinnitus at the beginning of the hearing loss. The degree of hearing loss ranged from mild to profound, one of them complained of vertigo, also one patients' hearing losses were bilateral, so both ears of patient were included in the study. Four of studied ears were left ears and 3 were right.

Recovery: The criteria used to define a successful recovery.

- *Complete*: PTA (dB HL) within 10 dB HL or10 dB of the baseline (HL of the unaffected ear).

- *Partial*: PTA (dB HL) >10-dB HL improvement.

- *No recovery*: PTA (dB HL) <10-dB HL improvement in HL.

Hearing improvement occurred in four patients, one returned to baseline hearing, two of them represented hearing improvement over than 20 dB in PTA, one recovered hearing that could benefit by hearing amplification, and 3 of 7 patients, 43% (n =3) who showed no improvement in PTA by treatment.

Age related to recovery

Recovery as related to patient age was studied. Forty-three percent of patients were under 60 years of age and had an overall recovery rate of 66.6%. While fifty seven percent of patients were 60 years of age or older and had an overall recovery rate of 50% (Table 2; Figure 1).

Recovery related to associated symptoms

Vertigo was present in one patient (14%) with a recovery rate of 100%. A total of 86% of patients did not have symptoms of vertigo and had an overall recovery of 50%.

Recovery related to severity of loss

Recovery of hearing as related to severity of initial loss was studied the patients with severe losses greater than 90 dB had a poorer recovery (8.3%) compared with losses Show positive relationship that were less than or equal to 90 dB (35.7% recovery) (Table 3; Figure 2).

Recovery related to diabetes

14% (n =1) of patients in the study had diabetes with complete recovering after intratympanic dexamethasone (not significantly different from nondiabetics).

Recovery related to time of onset of symptoms

All of patients treated within 3 weeks of SSHL range of 1 day to 21 days with 7 day mean duration of days from onset of symptoms to start therapy. All of them were received an earlier treatment. Therefore, we cannot compare an efficacy of earlier and later treatment.

Table 1: The collected data for the study.

No of Patients	Age	Sex	Duration in days	Diseased ear	PTA average Pre treatment	PTA average Post IV treatment	PTA average Post IT treatment
1	32 y	M	4	Rt	105	105	87
2	38 y	F	10	Rt	70	70	60
3	50 y	M	21	Lt	30	28	18
4	61 y	M	4	Lt	45	38	38
5	62 y	M	3	Lt	100	100	100
6	62 y	M	1	Rt	55	55	33
7	67 y	M	4	Lt	70	67	37

Table 2: Correlation of age with incidence of SSNHL.

Age group (years)	Total number and percentage of SSNHL patients	Recovery rate percentage
<60y	3(43%)	67%
>60	4(57%)	50%

Table 3: Rate of recovery with SSNHL grads.

Total number and percentage of SSNHL patients	Mild SSNHL patients	Moderate SSNHL patients	Sever SSNHL patients	Profound SSNHL patients
7	1(14%)	2(29%)	2(29%)	2(29%)
Recovery rate percentage	**Mild SSNHL patients**	**Moderate SSNHL patients**	**Sever SSNHL patients**	**Profound SNHL patients**
100%	100%	50%	50%	50%

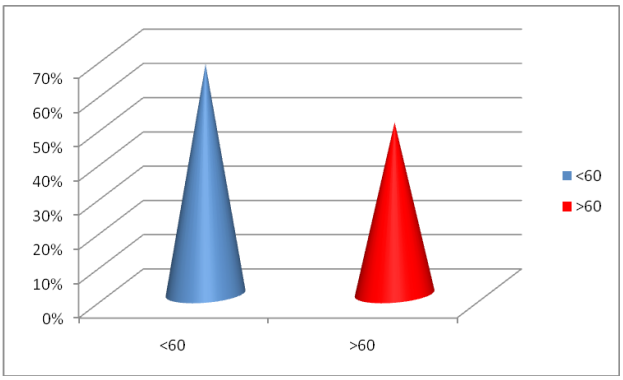

Figure 1: Correlation of age in years and percentage of SNHL.

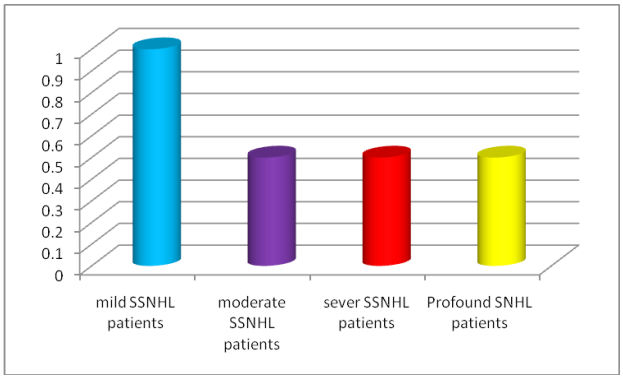

Figure 2: Correlation between rate of recovery and SSNHL severity.

DISCUSSION

In comparison to other studies reference, in spite of the difficulty in proving efficacy of a single modality secondary to multiple treatment protocols**;** Steroids, antiviral agents, anticoagulants, vasodilators, as well as a variable rates of recovery and high rate of spontaneous recovery.

Most of the studies have shown statistically significant benefit with systemic steroids in recovery of hearing in patients with SSNHL as they decrease the inflammation, improving cochlear blood flow.[7,8] On the contrary other studies have demonstrated the little benefit of systemic steroids in hearing recovery,[9] as we sought in our study. For this reasons as well as short-term and long-term complications from systemic steroids are well known to otolaryngologists. Leading to the continued investigation into directed therapy for inner ear disorders, including SSNHLsuch as an intratympanic steroid which offer the potential for directed therapy of a high concentration to the inner ear with avoidance of systemic side effects.[1,10-14] Like the most proposed therapies, the efficacy of intratympanic steroid therapy in the treatment of sudden HL has yet to be determined, although several reports have demonstrated efficacy especially after treatment failures. Two papers published by Battista[15]and Lauterman[16] have studied the effects on intratympanic steroids as a primary or adjunctively with systemic steroids; both of them reported that the addition of intratympanic steroids did not have a significant effect on the hearing recovery in sudden SNHL.

The first report of intratympanic steroids in the treatment of sudden SNHL was by Silverstein in 1996[1] with 12 patients followed by Parnes in 1999[17] with 13 patients. Several other reports have been published report such as;

Chandrasekhar, 2001 with recovery rate 73% of 14 patients.[18]

Kopke et al, 2001 with recovery rate 83% of 17 patients. [19]

Gianoli and Li, 2001 with recovery rate 44% of 15 patients.[20]

Lefebre and Staeker, 2002 with recovery rate 100% of 16 patients.[21]

Jackson, 2002 with recovery rate 31% of 18 patients.[23]

Gouveris, 2003 complete recovery: 33.3%, Partial: 39%, No recovery: 28.6% of 19 patients.[22]

Hoetal, 2004 with recovery rate 53% of 20 patients.[24]

Herr and Marzo, 2005 with recovery rate 53% of 21 patients.[13]

Battista, 2005 with recovery rate 20% of 24 patients.[15]

Slattery et al, 2005 with recovery rate 55% of 9 patients.[10]

Choung et al, 2006 with recovery rate 38.2% of 25 patients.[12]

Dallan et al, 2006 with recovery rate 75% of 26 patients.[25]

Comparing to our finding, the recovery rate was 57% of 7 patients treated with ITDI as salvage treatment after failure of systemic steroid.

CONCLUSION

An application of intratympanic dexamethasone injection significantly improves the recovery outcomes in cases of Sudden Sensorineural Hearing Loss and ITDI may be a simple and effective therapy for patients with SSNHL. Our results are compatible with the literatures.

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