ORIGINAL ARTICLE

ORAL CORTICOSTEROID THERAPY FOR SUDDEN SENSORINEURAL HEARING LOSS AND FACTORS AFFECTING PROGNOSIS

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Background: Sudden sensorineural hearing loss (SSNHL) is considered an otologic emergency globally. Aetiology is unknown in most cases but still the disease is believed to be caused by inflammation of the cochlea; therefore, steroids are considered beneficial due to their anti-inflammatory effect. **Methods:** This study was conducted on 62 patients of sudden sensorineural hearing loss (SSNHL) in Ayub Medical Complex, Abbottabad. The patients were given prednisolone and their response to the therapy was monitored. Factors like age of the patient, gender, degree of hearing loss and duration of symptoms at initial presentation were recorded and their effect of response of the patient was also noted. **Results:** The research subjects were 62 patients. Majority of the patients suffered from moderate to moderately severe hearing loss. Age and gender did not influence the response to the treatment. While the patients who presented earlier after the onset of disease and the patients who had milder degree of hearing loss at presentation had a better response to therapy. **Conclusion:** Oral corticosteroid therapy is a good therapeutic option for the treatment of sudden sensorineural hearing loss (SSHNL). The response to therapy is better in patients with milder hearing loss and those who present early to the otologist for treatment.

Keywords: Sudden sensorineural hearing loss; Oral corticosteroid therapy; Prognostic factors.

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INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is defined as a sudden increase (within 3 days) in hearing levels of three or more consecutive frequencies which is no less than 30 db.[1,2] This condition is considered an otologic emergency worldwide.[3] Fortunately this usually presents as a unilateral condition and rarely in only about 1–2% of the cases it is bilateral. No difference in the sex of the patient is noted in the data studied.

The aetiology of this condition is mostly unknown. But it is usually attributed to viral labyrinthitis leading to swelling and damage to the cochlea, or vascular compromise leading to decreased blood flow and resultant damage to hearing apparatus and lastly immune mediated damage to cochlea causing sudden hearing loss of the sensorineural type.[2] All of these conditions damage the cochlea by severe sudden inflammation and compression. Steroids have a very potent anti-inflammatory effect. In addition, they can be beneficial in immune mediated diseases. Steroids have been widely used for the treatment of sudden sensorineural hearing loss.[4]

Different doses and routes for administration of steroids have been used around the globe. Steroids have been given orally, intravenously and intra-tympanically. Good results have been shown with all the routes in majority of the cases. But in refractory cases intratympanic steroids have shown better results.[5] Other treatments used are hyperbaric oxygen therapy and prostaglandins.[4,6,7] In non-responding patients combined therapy with more than one drug has been used.[8] Also in refractory cases rheopheresis has also been tried with good results.[9]

The objective of our study was to assess the efficacy of oral steroid therapy in patients of sudden sensorineural hearing loss in different age groups. Also, we wanted to assess the variation in response to treatment in different duration of symptoms and degree of hearing loss at initial presentation of the patient.

MATERIAL AND METHODS

This observational study was carried out from January 2018 to December 2019 in ENT department of Ayub Medical Complex, Abbottabad. After taking approval from institutional ethical committee a total of 62 patients with sudden sensorineural hearing loss were included in the study after taking informed written consent. Patients of either gender or age who developed hearing loss within 3 days and confirmed sensorineural hearing loss in 3 frequencies on pure tune audiometry (PTA) were included in the study while all other cases of hearing loss were excluded from the study. Patients were given prednisolone in

full anti-inflammatory dose which is 1 mg/kg/day for 7 days. The blood pressure and blood sugar levels were monitored during this time. The PTA was repeated on day 3 and then on day 7 and those who showed complete recovery the steroid was tapered over the next 1 week. Also, in patients with no recovery or in patients with blood pressure or blood sugar fluctuations steroid was tapered over next 1 week. While those patients who showed partial response were continued with low dose of steroid till the complete recovery or static response on PTA and then the dose was tapered. The reports of initial and final PTA were also recorded. Different factors like age of the patient, duration of symptoms at initial presentation and degree of hearing loss at presentation were noted and their effect on the response to treatment was noted. The data was analysed by SPSS 21 and results were established.

RESULTS

A total number of 62 patients were included in the study. Out of these 40 were male and 22 were females.

These patients ranged from 14 years to 85 years with a mean of 44.66. Majority of the patients presented within the first 3 days of onset of symptoms and only 4 (6.5%) presented after 14 days of onset of hearing loss.

At the initial presentation the degree of hearing loss varied from mild hearing loss (40 dB) up to no response to 120 dB sound. More than 50 % of the patients were in the moderate to moderately severe hearing loss group which was from 45 – 70 dB hearing loss

Patients of all ages and both sexes presented with different degrees of hearing loss. No particular age group or sex was associated with any statistically significant degree of severity at presentation.

Treatment was given for 2–4 weeks to these patients according to the response to treatment as discussed earlier. 33 (53.2%) patients received treatment for 2 weeks, 17 (27.4%) for 3 weeks and only 12 (19.4%) for 4 weeks.

All of our patients responded to steroid therapy. Out of 62 patients 39 (63%) showed return of hearing to normal while 23 (37%) showed some degree of improvement. The hearing improvement in patients with different degrees of hearing loss at presentation is shown in table-3. This table shows that all types of hearing loss showed either some improvement or complete recovery of hearing. Significant difference was observed that patients with more severe hearing loss showed less improvement as compared to patients with milder degrees of loss. *p*-value <0.05.

There was no statistically significant difference between the improvement in hearing loss after treatment in different age groups and different sexes.

The patients who presented early in the course of disease showed more improvement as compared to the patients who presented late to us.

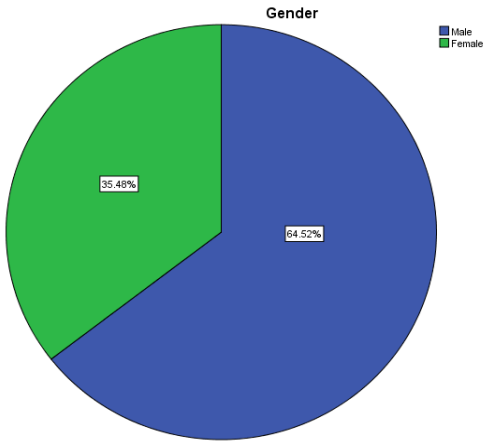

Figure 1: Gender Distribution

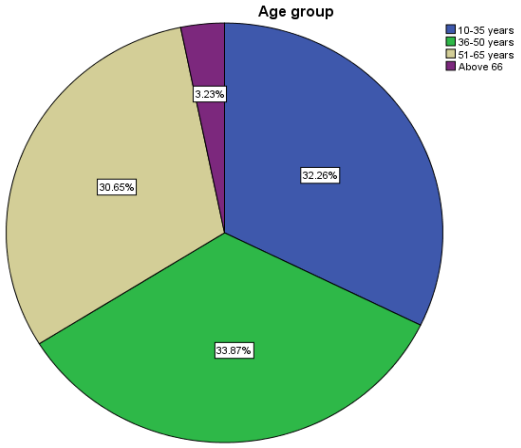

Figure 2: Age Groups of Patients

Table-1: Duration of Symptoms at presentation

		Frequency	Percent	Valid Percent
Valid	Within 3 days	25	40.3	40.3
	4-7 Days	24	38.7	38.7
	8-14 Days	9	14.5	14.5
	After 14 Days	4	6.5	6.5

Table-2: Degree of hearing loss at presentation

		Frequency	Percent	Valid Percent
Valid	Mild 40	10	16.1	16.1
	Moderate 55	17	27.4	27.4
	Mod Severe 70	17	27.4	27.4
	Severe 90	4	6.5	6.5
	Profound	6	9.7	9.7
	Dead Ear	8	12.9	12.9

Table-3: Hearing improvement in different degrees of hearing loss

Initial HL	Total cases	Normal hearing	Some improvement	No improvement	Mean improvement
Mild	10	10 (100%)	0	0	22dB
Moderate	17	14 (82.3%)	3 (17.7%)	0	30dB
Moderately severe	17	9 (52.9%)	8 (47.1%)	0	35dB
Severe	4	0	4 (100%)	0	36.25dB
Profound	6	4 (66.7%)	2 (33.3%)	0	59dB
Dead ear	8	2 (25%)	6 (75%)	0	59.37dB

Table-4: Hearing improvement with different duration of symptoms at presentation

		Grades improved						Total
		1	2	3	4	5	6	
Duration grouped	Within 3 days	6	4	6	2	6	1	25
	4–7 Days	10	5	7	1	0	1	24
	8–14 Days	0	9	0	0	0	0	9
	After 14 Days	2	0	2	0	0	0	4
Total		18	18	15	3	6	2	62

DISCUSSION

Sudden sensorineural hearing loss is a disease which presents in all age groups and both genders. It is not affected by any socioeconomic status and profession of the patient. The patient presents with sudden onset of hearing loss of more than 30dB which is usually overnight but it can present within 3 days. Exact aetiology is not known so it is also known as idiopathic sudden sensorineural hearing loss (ISSNHL). Like most of the idiopathic diseases it has been postulated that corticosteroids can be beneficial in patients of ISSNHL because of its anti-inflammatory Metabolic and immune modulatory response.

We aimed in our study to assess for the efficacy of oral corticosteroids in the therapeutic dose of 1mg/kg/day for 7 days in all patients which was tapered according to the comorbidities and response of the patients. In our study all the patients showed either complete or some recovery by this treatment. 63% of the patients showed complete return of hearing to normal which is comparable to Hwang *et al.*[1] who gave systemic steroids to the patients with ISSNHL and 15 of 18 (83%) patients recovered. Yashida *et al.*[10] reported 72% complete recovery of acute low tone hearing loss with steroids. Hosokawa *et al.*[8] reported recovery of 69% with steroids and hyperbaric oxygen. About 51% recovery was reported by Kostal *et al.*[9] and similar figures were reported by Stachler *et al.*[11] Xie *et al.*[2] showed 54.5% hearing improvement. Gallo *et al.*[12] and Stachler *et al.*[11] used high doses of steroids with improvement of 86±19% and 76% respectively. Similarly, Chen *et al.*[13] used oral steroids and showed complete recovery of 66%. While Kitoh *et al.*[14] used steroids in most of their patients and 41.2% showed complete recovery similarly Kang *et al.*[15] in their paper showed 34% complete recovery and Shim *et al.*[4] showed 32.2% improvement.

We included all the age groups in our study which included youngest patient of 14 years and oldest of 85 years. In our study age was not significantly associated with the response of treatment to the hearing loss which is similar to Gallo *et al.*[12] and Weiss *et al.*[16] While Kitoh *et al.*[14] observed significant recovery related to age. Shim *et al.*[4] observed better results in young patients. Conlin *et al.*[17]observed decreased chances of recovery in older patients. Chen *et al.*[13] observed better recovery in young patients while Chandrasekhar *et al.*[18]observed poor prognosis in younger and older patients.

Patients mostly present early in the course of the disease because SSNHL is a very disturbing condition for the patient. In our study patients presenting early had a better response to the treatment as compared to those who came in late. In most of the similar studies short duration of symptoms was associated with better results. Chen et al.[13]showed that early treatment results in better and high chances of recovery. Similarly, Hosokawa et al[8] observed high recovery where treatment was started within 7 days of onset. Gallo et al.[12]noted delay of treatment up to 7 days does not influence the results. Kang *et al.*[15] observed that the duration of symptoms at presentation is statistically related to improvement.

The initial degree of hearing loss was much variable in our patient group It varied from 40dB up to >100 dB. Significant difference was seen in the degree of improvement when compared for different degrees of hearing loss. The patients with mild and moderate degrees of hearing loss showed significantly better results as compared to patients of more severe hearing loss which is similar to Chen *et al.*[13] Gallo *et al.*[12] who reported 86% recovery in patients with mild degree of hearing loss. Hosokawa *et al*[8] and Shim *et al.*[4] observed poor recovery in patients with severe and profound hearing loss. Kang *et al.*[15] noted that severity of hearing loss is statistically related to recovery. While Hosokawa *et*

al.[8] showed better recovery in high degree hearing loss. Singh *et al*.[19] reported improvement of severe to profound hearing loss with steroids compared to no treatment.

CONCLUSION

Oral corticosteroids are overall safe and effective therapeutic option for the treatment of sudden sensorineural hearing loss. Prognosis of treatment is not affected by age of the patient but patients who present early in the course of disease and with less severe hearing loss show better results with treatment.

AUTHORS' CONTRIBUTION

TS: Concept, study design, data acquisition, draft writing. SMA: Concept, study design, data acquisition, draft writing. MIS: Concept, data acquisition. AH: Literature search, proof reading. AZ: Literature search, proof reading. SRQN: Literature search, proof reading. ZS: Literature search, data acquisition

REFERENCES

1. Hwang GH, Joo JW, Song IS, Rah YC, Choi J. Questionnaires in Patients with Unilateral Sudden Sensorineural Hearing Loss. J Int Adv Otol 2017;13(2):211–6.
2. Xie Y, Orabi NA, Zwolan TA, Basura GJ. Outcomes of unilateral idiopathic sudden sensorineural hearing loss: Two decades of experience. Laryngoscope Investig Otolaryngol 2019;4(6):693–702.
3. Jensen EAH, Harmon ED, Smith W. Early identification of idiopathic sensorineural sudden hearing loss. Nurse Pract 2017;42(9):10–6.
4. Shim HS, Joon SK, Kim MG. Comparative analysis of the combined therapeutic effects of lipoprostaglandin E_1 on sudden idiopathic sensorineural hearing loss. J Adiol Otol 2017;21(1):33–8.
5. Zanetti D, Berardino F, Nassif N, Zinis LRD. Intratympanic steroid delivery by an indwelling catheter in refractory severe sudden sensorineural hearing loss. Auris Nasus Larynx 2018;45(2):227–33.
6. Khater A, El-Anwar MW, Nofal AAF. Elbahrawy AT. Sudden sensorineural hearing loss: Comparative study of different treatment modalities. Int Arch Otorhinolaryngol 2018;22(3):245–9.
7. Okada M, Hato N, Nishio S, Kitoh R, Ogawa K, Kanzaki S, *et al*. The effect of initial treatment on hearing prognosis in idiopathic sudden sensorineural hearing loss: a nationwide survey in Japan. Acta Otolaryngol 2017;137:30–3.
8. Hosokawa S, Sugiyama K, Takahashi G, Takebayashi S, Mineta H. Prognostic factors for idiopathic sudden sensorineural hearing loss treated with hyperbaric oxygen therapy and intravenous steroids. J Laryngol Otol 2017;131(1):77–82.
9. Kosta M, Drsata J, Blaha M, Lanska M, Chrobok V. Rheopheresis in treatment of idiopathic sudden sensorineural hearing loss. J Otolaryngol Head Neck Surg 2017;46(1):50.
10. Yoshida T, Sone M, Kitoh R, Nishio S, Ogawa K, Kanzaki S, *et al*. Idiopathic sudden sensorineural hearing loss and acute low tone sensorineural hearing loss: a comparison of the results of a nationwide epidemiological survey in Japan. Acta Otolaryngol 2017;137:38–43.
11. Stacheler RJ, Chandrasekhar SS, Archer MS, Rosenfeld RM, Schwartz SR, Barrs DM, *et al*. Clinical practice guideline: sudden hearing loss. Otolaryngol Head Neck Surg 2012;146(3 Suppl):1–35.
12. Gallo DE, Khojasteh E, Gloor M, Hegemann SCA. Effectiveness of systemic high dose dexamethasone therapy for sudden sensorineural hearing loss. Audio Neurotol 2013;18(3):161–70.
13. Chen WT, Lee JW, Yuan CH, Chen RF. Oral steroids treatment for idiopathic sudden sensorineural hearing loss. Saudi Med J 2015;36(3):291–6.
14. Kitoh R, Nishio S, Ogawa K, Kanzaki S, Naohito H, Sone M, *et al*. Nationwide epidemiological survey of idiopathic sudden sensorineural hearing loss in Japan. Acta Otolaryngo 2017;137:8–16.
15. Kang WS, Yang CJ, Shim M, Song C, Kim TS, Lim HW, *et al*. Prognostic factors for recovery from sudden sensorineural hearinh loss: A retrospective study. J Audiol Otol 2017;21(1):9–15.
16. Weiss D, Bocker AJ, Koopmann M, Savvas E, Borowski M, Rudack C. Predictors of hearing recovery in patients with severe sudden sensorineural hearing loss. J Otolaryngol Head Neck Surg 2017;46(1):27.
17. Conlin AE, Parnes LS. Treatment of sudden sensorineural hearing loss: A systematic reciew. Arch Otolaryngol Head Neck Surg 2007;133(6):573–81.
18. Chandrasekhar SS. Intratympanic dexamethasone for sudden sensorineural hearing loss: clinical and laboratory evaluation. Otol Neurotol 2001;22(1):18–23.
19. Singh A, Irugu DVK. Sudden sensorineural hearing loss. A contemporary review of management issues. J Otol 2020;15(2):67–73.

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