

Original Research Article

Treatment of idiopathic sudden sensorineural hearing loss in diabetic patients by oral prednisolone

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ABSTRACT

Background: Idiopathic sudden sensorineural hearing loss should be treated urgently without delay by steroid therapy. The study purpose was to determine the efficacy of oral steroids in treatment of ISSNHL in patients with diabetes mellitus.

Methods: Prospective cohort study of diabetic patients with ISSNHL to evaluate the effectiveness of oral prednisolone in improvement of hearing. It included 30 patients aged 40-65 years that fulfilled the inclusion criteria. Oral prednisolone 1mg/kg was administered for 2 weeks. Hearing was assessed pre and post treatment by measuring the pure tone average in the form of mean and standard deviation. Blood sugar was monitored by a glucometer.

Results: 12 diabetic females and 18 diabetic males were enrolled in this study. There was highly significant improvement in the post treatment pure tone averages at all frequencies without any recorded side effects or complications.

Conclusions: Oral Prednisolone was highly efficient in rapid improvement of hearing in cases of ISSNHL in patients with diabetes mellitus with no need for intratympanic steroid injection in any patient. There was not reported any side effects or complications

Keywords: Sudden hearing loss, Prednisolone, Pure tone average, Intratympanic injection

INTRODUCTION

Idiopathic Sudden Sensorineural Hearing Loss (ISSNHL) is abrupt in onset with rapidly progressive loss of hearing without obvious cause that occurs within a few days (≤ 3 days); mostly in one side and documented in the audiogram by increased pure tone average in at least three contiguous frequencies.¹ Some authors diagnosed sudden hearing loss even in one frequency. Sudden SNHL is considered medical emergency and should be treated urgently without delay even before completing the investigations.² Steroid is the gold standard medicine in treating this urgent incident. Many studies reported good result with a satisfactory recovery rate with the use of oral corticosteroids. Steroids of different types as

methylprednisolone or dexamethason can be injected into the middle ear that ultimately diffused through the round window to enter the inner ear.^{3,4} Kakehata et al performed a prospective non-randomized comparative study on a group of patients to find the efficacy of systemic versus intra tympanic (IT) injection of different types of corticosteroid in diabetic patients with SSNHL. There were no significant differences between the two groups in cure rates and successful treatment.⁵ IT steroid injection is an invasive technique that needs local anesthesia, attains special positioning of the patient, and repeated injections at least four times. IT is a procedure which is painful and may result in tympanic membrane perforation and dizziness.⁶ Time to treatment is considered the most prominent prognostic factor as without doubt the early to

start the treatment the rapid the occurrence of the recovery. Most of otolaryngologists prefer to start treatment of ISSHL by oral steroids because it is non invasive and effective but the situation is different in cases with diabetes mellitus. In case of diabetic patients many otolaryngologists find themselves confused between the simple use of oral prednisolone and the procedural use of IT steroid injection. The aim of the presenting study is to report the efficiency of oral prednisolone in treatment of ISSNHL in a group of diabetic patients.

METHODS

After taking the approval from our institution and taking the consent from patients, 30 patients were enrolled in the study. Inclusion criteria were diabetic patients under oral antidiabetic medicine who refused intratympanic steroid injection, no history of cardiac, renal or hepatic diseases, no hypertension, and no other systemic disease, no history of chronic otitis media or ear operations. Exclusion criteria were any patient with systemic disease, organ deficits, chronic otitis media, ear operations or diabetics under insulin therapy. This prospective cohort study was conducted from January 2019 to December 2022. It included 30 patients with idiopathic sudden sensorineural hearing loss. They were selected from the outpatient ear clinic and from emergency department, of Al Lulu Medical complex, in Jubail, KSA. All patients were diagnosed by the history of acute onset of hearing loss with documented audiogram confirming the hearing loss at least 30 db in three consecutive frequencies. In all patient fasting blood sugar was measured before starting the treatment and daily monitoring by the Acc-Check Active/Roche. The antiglycemic drugs are modified by the internist. Oral prednisolone was given to all patients in a dose of 1mg/kg daily for 14 days then tapered over one week. Audiometry was measured after 2 weeks from start

of treatment. Statistical analysis was completed by using MedCalc' software program.

RESULTS

The presenting study included 30 diabetic patients with ISSNHL who refused IT steroid injection; they were 12 female and 18 males, age range 40-65 years. In all cases fasting blood sugars were controlled at 120 ± 5.0 mg/dl. The average time to start of treatment was 5 ± 2.0 days. Tinnitus was detected in 5 patients. Vertigo was not detected in any patient and there were no neurological symptoms. There were 5 cases of tinnitus where they were improved at the end of treatment course (Table 1). Audiometric results were improved significantly at all frequencies. At 500 Hz hearing frequency, the pure tone average was improved from (44.75 ± 5.12) to (21.25 ± 6.29) , at 1000 Hz PTA changed from (47.03 ± 12.17) to (21.25 ± 5.5) , at 2000 Hz PTA changed from (46.0 ± 5.80) to (19.0 ± 4.89) , at 4000 PTA improved from (47.70 ± 6.020) to become (21.0 ± 5.15) and at 8000 hz PTA changed from (46.0 ± 4.6) to (22.25 ± 5.12) . The post treatment improvement in the PTA was significant at all frequencies with p value ($p < 0.0001$) (Table 2).

Table 1: different variables and related values.

Variables	Values
Number	30
Male/Female	18/12
Age	40-65 (45 $\pm$ 9)
Fasting blood sugar	120 $\pm$ 5
Time to Treatment	≤ 10 days (5 $\pm$ 2.0)
Tinnitus	5
Vertigo	non
Improved	30

Table 2: Pure tone average (PTA) before and after treatment.

Frequencies mean $\pm$ SD	Before Tr.	2 weeks after Tr.	95% CI	P value
500	44.75 $\pm$ 5.12	21.25 $\pm$ 6.29	-27.17 to -19.83	<0.0001
1000	47.03 $\pm$ 12.17	21.25 $\pm$ 5.5	-31.83 to -19.73	<0.0001
2000	46.0 $\pm$ 5.80	19.0 $\pm$ 4.89	-30.43 to -23.57	<0.0001
4000	47.70 $\pm$ 6.02	21.0 $\pm$ 5.15	-30.29 to -23.11	<0.0001
8000	46.0 $\pm$ 4.6	22.25 $\pm$ 5.12	-26.87 to -20.63	<0.0001

Tr: Treatment; CI: confidence interval.

DISCUSSION

Diagnosis of idiopathic SNHL is initially diagnosed by the history of recent onset, unilateralism, with absence of neurological defects. So, the diagnosis is made on the bases of high suspicious. Audiometric test is highly recommended to document the pattern of hearing loss and considered the base for measuring the response of treatment. CT scanning as well as MRI of the temporal bone and brain are not highly recommended by the

guideline team unless there were suspicious of mass occupying lesions or infarctions.¹ Steroids have been well known as the gold standard treatment of ISSNH loss. Oral steroids are easy to administer without pre therapy preparation and without invasive procedures.⁷ Practitioners should start steroid therapy without delay just the diagnosis become suspected. The oral dose schedule and its calculation are very easy with high compliances of patient and physician. Blood sugar in diabetic patients can be easily and conveniently controlled by an internist by

increasing the dose of anti-diabetic therapy and by restriction of diet reach in sugars. Most otolaryngologists prefer IT steroid injection as the first priority in treating ISSNHL in diabetic patients in order to avoid its systemic side effects and its effect of possible elevation of blood sugar level. On other way some tend to avoid IT injection of steroid because it needs preparation with equipped places that may need referral to a hospital, also may have the risk of drum perforation that result in conductive hearing loss or change the condition to persistent otitis media.^{6,8} In my opinion the complications of IT steroid injection as tympanic membrane perforation is difficult to be prevented and treated and may progress to chronically draining ear. On the other way the blood sugar in diabetic patient can be easily adjusted and controlled during the course of treatment. The challenge is to not change the commonly practiced protocol which has been used in treating patients with ISSNHL for just the patient has diabetes. In our study oral steroids made significant improvement of hearing in all patients after 2 weeks from the beginning of medicine. Blood sugars were effectively controlled during the period of treatment. Oral steroids in our study had no adverse side effects, complications or complaints from the patients.

Limitations

The current study was of limited number of patients, with lack of multicenter studies.

CONCLUSION

Oral steroids should be the initial treatment regimen in ISSNHL even in diabetic patient, and the dose should be the same as in non-diabetic patients. Blood sugar of diabetic patient should be adjusted by an internist during the treatment course. IT injection is an invasive procedure which needs special preparation and place, and is only used as a second line in cases of failure of the initial line.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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