JEURMEDS Journal of Eurasian Medical Science

Original Article

Jeurmeds 2021;2(2):50-54 • **DOI:** 10.5578/jeurmeds.20210303

Comparison of Paranteral Steroid and Paranteral Steroid+ Antiviral Treatment in the Treatment of Sudden Hearing Loss

Sedat ALAGÖZ[1], **Hakkı UZUNKULAOĞLU**[2]

[1] University of Health Sciences, Adana City Training and Research Hospital, Clinic of Ear, Nose and Throat, Adana, Turkey
[2] Ankara Training and Research Hospital, Clinic of Ear, Nose and Throat, Ankara, Turkey

Cite this article as: Alagöz S, Uzunkulaoğlu H. Comparison of paranteral steroid and paranteral steroid+antiviral treatment in the treatment of sudden hearing loss. JEURMEDS 2021;2(2):50-54.

ABSTRACT

Objective: Idiopathic sudden hearing loss (SHL), which occurs as an acute loss of kohlea functions, is one of the autology emergencies whose diagnosis and treatment should not be delayed. Many options have been used for the treatment of SHL, including steroids, antiviral drugs, vasodilators, plasma expanders, intravenous contrast agents, carbon inhalation, corticosteroids and shotgun therapy, all of which are applied together. In our study, we aimed to investigate the effectiveness of parenteral steroid and parenteral steroid+antiviral therapy in SHL.

Material and Methods: In the study, the data of 32 patients who were treated with the diagnosis of idiopathic sudden hearing loss between March 2006 and December 2008 were retrospectively analyzed. The data of 16 patients (Group 1) who underwent parenteral methylprednisolone treatment according to the treatment method given were compared statistically with the data of 16 patients (Group 2) treated with parenteral methylprednisolone+acyclovir.

Results: Comparing the earnings in the pure voice average in the first and forth weeks of the odtological examinations between the two groups, there was no difference in terms of improvement in hearing. When the improvement in hearing loss at 500-1000-2000-4000 Hz in the pure sound audiometer was compared between the two groups, no statistically significant difference was found.

Conclusion: It was observed that there was no difference in efficacy between the administration of parenteral steroid and parenteral steroid+aciviral in the treatment of SHL. Considering the insufficient number of patients in our study, we think that our study is a preliminary study and will contribute to future studies.

Keywords: Sudden hearing loss, steroids, antiviral

ÖZ

Ani İşitme Kaybının Tedavisinde Paranteral Steroid ve Paranteral Steroid+Antiviral Tedavinin Karşılaştırılması

Giriş: Çalışmamızda idiyopatik ani işitme kaybı (AİK)'nda parenteral steroid ve parenteral steroid+antiviral tedavisinin etkinliğinin araştırılması amaçlanmıştır.

Gereç ve Yöntemler: Çalışmada Mart 2006 ile Aralık 2008 tarihleri arasında idiyopatik ani işitme kaybı tanısı konularak tedavi edilen 32 hastanın dosya verileri retrospektif olarak incelenmiştir. Verilen tedavi yöntemine göre parenteral metilprednizolon tedavisi uygulanmış 16 hastanın (Grup 1) verileri ile parenteral metilprednizolon+asiklovir tedavisi uygulanan 16 hastanın (Grup 2) verileri istatistiksel olarak karşılaştırılmıştır.

Bulgular: İki grup arasında birinci ve dördüncü hafta yapılan odyolojik tetkiklerdeki saf ses ortalamasındaki kazançlar karşılaştırıldığında, işitmedeki düzelme açısından aralarında fark bulunmadı. İki grup arasında saf ses odyometresindeki 500-1000-2000-4000 Hz'deki işitme kayıplarındaki düzelme ayrı ayrı frekans bazında karşılaştırıldığında istatistiksel olarak bir farklılık bulunamadı.

Sonuç: AİK tedavisinde parenteral steroid ile parenteral steroid+asiviral verilmesi arasında etkinlik açısından fark olmadığı görüldü. Çalışmamızdaki hasta sayısındaki yetersizlik göz önünde bulundurulduğunda çalışmamız ön çalışma niteliğinde olup sonraki çalışmalara katkı sağlayacağını düşünmekteyiz.

Anahtar Kelimeler: Ani işitme kaybı, steroid, antiviral

Corresponding Address

Sedat ALAGÖZ

University of Health Sciences,
Adana City Training and Research Hospital,
Clinic of Ear, Nose and Throat,
ADANA-TURKEY
e-mail: alagozsedat@gmail.com

Received: 05.05.2021
Accepted: 13.07.2021
Available Online Date: 27.08.2021

INTRODUCTION

Although there is no general definition of sudden hearing loss (SHL), it is defined as a type of inner ear hearing loss that usually occurs in a few hours or days. Many otolaryngologists accept the definition by Wilson. Accordingly, sudden hearing loss is the sensorineural hearing loss of 30 dB or greater over at least three contiguous audiometric frequencies occuring over 72 hours (1-3).

While the incidence of SHL in the literature has been reported as 5-20 in 100.000 persons annually, the incidence of bilateral involvement ranges between 1% and 4% (4).

SHL is most commonly seen in the 30-60 year age group. Mean age of the patients is between 46 and 49 years. While its incidence is low in the 20-30 year age group, its incidence sees an increase in the 50-60 year age group (14,5,6). Various studies have reported similar sex distributions (7-12).

Detection of definite etiological agent is usually difficult in SHL. Many researchers agree that SHL is a multifactorial disease (13).

There are scores of studies oriented at the treatment of SHL. Notably corticosteriods and vasoactive agents, antiviral drugs and hyperbaric oxygen are among the most commonly applied treatment options. The undefinite etiology of SHL prevents clinicians to focus on a specific treatment. Moreover, studies on the subject have put forth different diagnostic methods, treatment modalities, and recovery and follow up criteria, and various treatment combinations are used most of the time (14,15).

In the light of the literature, this study aimed to statistically discuss the differences of the efficacies of parenteral steroid and parenteral steroid+antiviral treatments employed to patients by comparing the data on their files retrospectively.

MATERIALS and METHODS

The study included retrospective records of 32 patients treated for SHL between March 2006 and December 2008 in the ENT Clinic of Ankara Training and Resarch Hospital, Ministry of Health. Patients who presented to the clinic on the first 14 days of the onset of complications were included into the study. Our patients suffered sensorineural hearing loss (SNHL) of 30 dB or greater over at least three contiguous audiometric frequencies. Patients' detailed anamneses, ENT examinations, otoneurological examinations including cranial nerves related to the vestibular system, and the data on laboratory parameters, radiological imagings, and audiological tests were reached from their files. Patients in whom etiology had been detected were excluded from the study. Patients diagosed with idiopathic sudden hearing loss were divided into two groups as Group 1 receiving only parenteral methylprednisolone treatment and Group 2 receiving methylprednisolone+parenteral asiviral treatment, and their pure tone audiometry data were recorded. Steroid treatment was started with parenteral methylprednisolone 1 mg/kg and the dosage was lowered gradually and stopped on the 14th day. Antiviral treatment was given parenterally as acyclovir 5 x 400 mg/day for five days.

On pure tone audiometry of both groups, the values of hearing threshold at 500-1000-2000-4000 Hz were separately recorded, and pure tone average values at 500-1000-2000 were also recorded.

Since the data in our study were obtianed by retrospetive file screening, ethics board approval was not deemed necessary.

Statistical Evaluation

Data analyses were performed on SPSS for Windows 11.5 package program. Shapiro Wilk test was used to compare if the measurements of hearing loss and pure tone average were close to normal distribution. For descriptive statistics, age was expressed as mean ± standard deviation, time of presentation was expressed as median (min-max), hearing loss and pure tone average values were expressed as median (25-75.) percentages, and nominal variables were given as number and percentage (%). The importance of the difference of mean values between the groups was evaluated with Student's t test, and the significance of the difference in terms of median values was evaluated with Mann-Whitney U test. Nominal variables were studied with Pearson's Chi-s test of Fisher's Exact test. Spearman's Correlation test was used to detect if there was a significant correlation between continuous variables. Wilcoxon Signed Rank Test was used to assess if there was a statistically significant change in values of hearing loss and pure tone average in time within the groups. Change measures, which occurred at 2000 frequency in week one as regards the basis, in week four as regards the basis, and in week four as regards week one, were calculated. $p< 0.05$ was accepted as statistically significant. Bonferroni Correction was performed to control Type 1 error in all probable multiple comparison tests.

RESULTS

Thirty-two patients with SHL whose file records could be reached were included into the study. Mean age and sex distributions were similar between the groups ($p= 0.407$ and $p= 1.000$). A significant difference was not detected between the groups in terms of the side of the treated ears ($p= 0.264$). (Table 1).

Table 1. Demographic data of the patients

Variables	Group 1 (n= 16)	Group 2 (n= 16)	p
Age	50.9 ± 14.2	47.0 ± 12.3	0.407
Sex: Male/Female	13/3	13/3	1.000
Side: Right/Left	9/7	12/4	0.264
Day of presentation (day)	3.5 (1-13)	3 (1-10)	0.381

Prior to the treatment, hearing loss at 500, 1000, 2000 and 4000 Hz frequencies and pure tone average were statistically similar (p= 0.867; p= 0.323; p= 0.323; p= 0.402 and p= 0.361).

In comparison to the state before treatment, a statistically significant decrease was seen in the hearing loss of Group 1 at 500 Hz frequency at post-treatment first and fourth weeks (p= 0.005 and p= 0.003). Although hearing loss decreased in the forth week as compared to the first week after treatment, it was not statistically significant (p= 0.011). In Group 2, although hearing loss decreased at 500 Hz frequency at post-treatment first week, there was no statistical significance (p= 0.010). Compared to the pre-treatment period, a statistically significant decrease in hearing loss was seen at only post-treatment forth week (p= 0.005). Post-treatment, the hearing loss between the first and fourth weeks was statistically significant (p= 0.017).

A statistically significant decrease was seen at post-treatment first and fourth weeks at 1000 Hz frequency in Group 1 compared to the pre-treatment period (p= 0.005 and p= 0.003). Hearing loss at post-treatment first and fourth weeks was statistically similar (p= 0.027). In Group 2, a statistically significant decrease was seen at post-treatment first and fourth weeks at 1000 Hz frequency compared to the pre-treatment period (p=0.006 and p= 0.005). Significant decrease was found at the fourth week of treatment as regards the post-treatment first week (p= 0.007).

In Group 1, a statistically significant decrease was seen at post-treatment first and fourths week at 2000 Hz frequency in Group 1 compared to the pre-treatment period (p= 0.005 and p= 0.005). A statistical significance was not established although there was a decrease in hearing loss at the fourth week of treatment as regards the post-treatment first week (p= 0.026). In Group 2, a statistically significant difference was not found at post-treatment first and fourth weeks at 2000Hz frequency compared to the pre-treatment period (p= 0.018 and p= 0.008). A statistically significant difference was not found although there was a decrease in hearing loss at post-treatment fourth week as regards the post-treatment first week (p= 0.012).

In Group 1, a statistical significance was not seen at post-treatment first week at 4000 Hz frequency compared to the pre-treatment period (p= 0.018). A statistically significant decrease was confirmed in hearing loss at post-treatment fourth week compared to the pre-treatment period (p= 0.005). Hearing loss at post-treatment first and fourth weeks was statistically similar (p= 0.011). In Group 1, a statistical significance was not seen even though there was decrease in hearing loss at post-treatment first and fourth weeks at 4000 Hz frequency compared to the pre-treatment period (p= 0.023 and p= 0.008). There was no statistically significant difference even though hearing loss was decreased at post-treatment fourth week compared to post-treatment first week (p= 0.019).

In Group 1, a statistically significant decrease was confirmed in pure tone average at post-treatment first and fourth weeks compared to the pre-treatment period (p= 0.003 and p= 0.003). There was no statistically significant difference even though pure tone average was decreased at post-treatment fourth week compared to post-treatment first week (p= 0.012). In Group 2, a statistically significant decrease was confirmed in pure tone average at post-treatment first and fourth weeks compared to the pre-treatment period (p= 0.006 and p= 0.005). There was a statistically significant decrease in pure tone average at post-treatment fourth week compared to post-treatment first week (p= 0.004) (Table 2).

DISCUSSION

The reason and treatment of idiopathic SHL remain debatable despite years of research. This disease causes individuals to lose self-confidence and negatively affects their social and professional life.

The etiology of idiopathic SHL is unknown. Treatment criteria in audiometric tests are not fixed, and treatment modalities are variable. In a study by Tae-min et al. conducted with 2401 cases in 2018, it was put forth that the addition of hyperbaric oxygen treatment to medical treatment had more advantageous outcomes. In a prospective, randomized, double-blind study by Probst et al., a difference has not been established between the dextran and pentoxifylline group and

Table 2. Hearing loss and levels of pure tone average according to frequencies before and first and fourth weeks after treatment in the groups

Frequencies (Hz) Groups	Pre-treatment	Post-treatment First week	p[a]	Post-treatment Fourth week	p[b]	p[c]
Frequency: 500						
Group 1	67.5 (36.25-88.75)	40.0 (20.0-73.75)	0.005	27.5 (15.0-67.5)	0.003	0.011
Gorup 2	70.0 (42.5-80.0)	35.0 (20.0-58.75)	0.010	25.0 (16.25-55.0)	0.005	0.017
Frequency: 1000						
Group 1	65.0 (31.25-87.5)	32.5 (16.25-78.75)	0.005	27.5 (15.0-73.75)	0.003	0.027
Group 2	77.5 (51.25-90.0)	42.5 (30.0-70.0)	0.006	25.0 (20.0-58.75)	0.005	0.007
Frequency: 2000						
Group 1	70.0 (31.25-86.25)	55.0 (15.0-70.0)	0.005	40.0 (11.25-67.5)	0.005	0.026
Group 2	77.5 (55.0-93.75)	45.0 (22.5-71.25)	0.018	25.0 (20.0-60.0)	0.008	0.012
Frequency: 4000						
Group 1	65.0 (42.5-86.25)	57.5 (25.0-68.75)	0.018	40.0 (21.25-67.5)	0.005	0.011
Group 2	70.0 (56.25-91.25)	55.0 (20.0-77.5)	0.023	32.5 (16.25-70.0)	0.008	0.019
Pure Tone Average						
Group 1	68.5 (34.0-87.5)	38.5 (18.25-73.0)	0.003	32.0 (13.5-68.5)	0.003	0.012
Group 2	75.0 (55.5-84.5)	38.5 (25.5-68.5)	0.006	23.0 (18.25-56.0)	0.005	0.004

[a] *Comparison between the pre-treatment period and post-treatment first week (The results were accepted statistically significant for p< 0.008 reagrding Bonferroni Correction).*
[b] *Comparison between the pre-treatment period and post-treatment fourth week (The results were accepted statistically significant for p< 0.008 reagrding Bonferroni Correction).*
[c] ***Comparison between the post-treatment first and fourth weeks*** *(The results were accepted statistically significant for p< 0.008 reagrding Bonferroni Correction).*

the placebo group (18). Kronenberg et al. have stated that there is no difference between the patients treated with IV procaine and low-molecular weighted dextran and placebo (20). Redleaf et al., in retrospective study, have espressed that a tendency to improve was seen in patients administered with IV contrast. In a prospective study by Byl conducted on 225 patients, it has been indicated that no treatment was different from spontaneous recovery; however, considering studies highlighting steroid approached, Byl has emphasized that steroids should be the standard treatment of SHL (3,4,17,21).

Stokroos at al. have stated that amelioration in hearing was established with acyclovir at the viral labrynthitis they incurred experimentally in pigs and improvement was provided in cochlear histopathology (22). In another study by Stokroos et al. acyclovir protocol with streoid was administered to 44 patients, and a difference was not established with this treatment and other treatment methods (23). In our study, the addition of acyclovir to treatment did not have any contribution to the return of hearing. Stokroos et al. have divided the approach to treatment in two phases due to the fact that experimental method and clinical method yield different outcomes. They have recommended treating SHL in the early period with acyclovir combined with prednisone and with only prednisole in the late period (22).

In Group 1 of our study, a statistically significant decrease was seen in the pure tone average at post-treatment first and fourth weeks compared to the pre-treatment period (p= 0.003 and p= 0.003). There was no statistically significant difference even though pure tone average was decreased at post -treatment fourth week compared to post-treatment first week (p= 0.012). In Group 2, a statistically significant decrease was confirmed in pure tone average at post-treatment first and fourth weeks compared to the pre-treatment period (p= 0.006 and p= 0.005). There was a statistically significant decrease in pure tone average at post-treatment fourth week compared to post-treatment first week (p= 0.004). When the hearing loss comparison in pure tone audiometry between the two groups was evaluated separately in terms of hearing loss at 500-1000-2000-4000 Hz, a difference was not established between the two groups in terms of treatment efficacy.

In both groups of our study, a 46% improvement was achieved. Our rate of improvement is consistent with that of Chen et al. (46%) (24). Other studies have reported higher improvement rates. Wilson has accepted improvement in hearing as a 50% increase and reported 61% improvement (21). Using the same criteria, Tucc et al. have reported a 65% improvement (25). Nonetheless, Chinemon has accepted 15 dB improvement as amelioration and reported a rate of 60% (26).

The number of cases in our study may not be sufficient. However, as in a majority of studies conducted on SHL, the number of patients participating in the study remains low due to the low incidence of the disease. Moreover, when study inclusion criteria are strictly followed, reaching a sufficient number becomes more difficult. While evaluating the efficacy of a treament given additionally, it should be noted that the disease spontaneously improves at a rate as high as 40-65%. This study is recommended to be conducted with a larger group of patients in idiopathic SHL.

CONCLUSION

It was seen that there was no difference in efficacy between the administration of parenteral steroid and parenteral steroid+acyclovir in SHL treatment. Considering the low number of patients in our study, we believe that our study is a preliminary study that would contribute to further studies.

Ethics Committee Approval: This study was produced from the thesis of Op. Dr. Sedat Alagöz. Also the study is retrospective. That is why it is not possible to have ethical approval. Besides, informed patient consent was taken from the patient.

Author Contributions: Concept/Design: SA, HU; Analysis/Interpretation: SA, HU; Data Acquisition: SA, HU; Writting: SA, HU; Critical Revision: SA, HU; Final Approval: SA.

Conflict of Interest: The authors declare that they have no conflict of interest.

Financial Disclosure: No financial support was received.

REFERENCES

1. *Akyıldız N. Kulak Hastalıkları ve Mikroşirürjisi. 2002;2:681-7.*
2. *Bredenkamp JK, Shelton C. Sudden hearing loss, determining the spesific cause and the most appropiate treatment. Postgrod Med 1989;86(2):125-8.*
3. *Moskowitz, D, Lee KJ, Smith HW. Steroid use in idiopathic sudden sensoineural hearing loss. Laryngoscope 1984;94(Pt 1):664-5.*
4. *Byl JR. Sudden hearing loss: Eight years experience and suggested prognostic table. Laryngoscope 1984;94(5 Pt 1):647-61.*
5. *Halberg OE. Sudden deafness of obscure origin. Laryngoscope 1956;66(10):1237-67.*
6. *Mattox DE, Simmons FB. Natural history of sudden sensorineural hearing loss. Ann Otol 1977;86(4 Pt 1):463-79.*
7. *F T Shaia, J L Sheehy. Sudden sensori-neural hearing impairment: a report of 1,220 cases Laryngoscope 1976;86(3):389-98.*
8. *Eisenman DJ. Arts HA. Effectiveness of treatment for sudden sensorineural hearing loss. Arch Otolaryngol Head Neck Surg 2000;126(9):1161-4.*
9. *Kwartler JA, Fred H, Jahn F. Sudden hearing loss due to AIDS-related cryptococcal meningitis: a temporal bone study. Otolaryngol Head Neck Surg 1991;104(2):265-9.*
10. *Michels EM, Herzon FS. Functional hearing loss presenting as sudden hearing loss. Am J Otol 1984;5(5):407-10.*
11. *Saunders WH. Sudden deafness and its several treatments. Laryngoscope 1972;82(7):1206-13.*
12. *Yamamoto M, Kanzaki J, Ogawa S, Tsuchinashi N. Evaluation of hearing recovery in patinets with sudden deafness. Acta Otolaryngol (Stockh) 1994;514:37-40.*
13. *Slattery WH, Fisher LM, Iqbal Z, Liu N. Oral steroid regimens for idiopathic sudden sensorineural hearing loss. Otolaryngol Head Neck Surg 2005;132(1):5-10.*
14. *Özel H, Genç S, Özdoğan F, Esen E, Selçuk A. Ani işitme kaybında kanıta dayalı tedavi. Kocaeli Tıp Dergisi 2014;3:39-47.*
15. *Mattox DE, Lyles CA. Idiopathic sudden sensorineural hearing loss. Am J Otol 1989;10(3):242-7.*
16. *Silverstein H, Choo D, Rosenberg SI, Kuhn J, Seidman M, Stein I. Intaratympanic steroid treatment of inner ear disease and tinnitus (preliminary report). Ear Nose Throat J 1996;75(8):468-71.*
17. *Stokroos RJ. Albers FWJ. Therapy of idiopathic sudden sensorineuralhearing loss. A review of the literature. Acta Otorhinolaryngol Belg 1996;50(1):77-84.*
18. *Probst R, Tschopp K, Ludin E, Kellerhals B, Podvinec M, Pfaltz CR. A randomized, double-blind, placebo-controlled study of dextran/penotxifylline medication in acute acoustic trauma and sudden hearing loss. Acta Otolaryngol (Stockh) 1992;112(3):435-43.*
19. *Tae-Min R, Doyeon H, Jee-Soo L , Jonghanne P, Joo Myung L. Addition of hyperbaric oxygen therapy vs medical therapy alone for idiopathic sudden sensorineural hearing loss a systematic review and meta-analysis. JAMA Otolaryngol Head Neck Surg 2018;144(12):1153-61.*
20. *Kronenberg J, Almagor M, Bendet E, Kushnir D. Vasoactive therapy versus placebo in the treatment of sudden hearing loss: a double-blind clinical study. Laryngoscope 1992;102(1):65-8.*
21. *Wilson WR, Byl FM, Laird N. The efficacy of steroids in the treatment of idiopathic sudden hearing loss: a double- blind clinical study. Arch Otolarngol 1980;106(12):772-6.*
22. *Stokroos RJ, Albers FW, Schirm J. Therapy of idiopathic sudden sensorineural hearing loss: antiviral treatment of experimental herpes simplex virus infection of the inner ear. Ann Otol Rhinol Laryngol 1999;108(5):423-8.*
23. *Stokroos RJ, Albers FW, Tenvergert EM. Antiviral treatment of idiopathic sudden sensorineural hearing loss: a prospective, randomized, double-blind clinical trial. Acta Otolaryngol (Stockh) 1998;118:488-95.*
24. *Chen CY, Halpin C, Rauch SD. Oral steroid treatment of sudden sensorineural hearing loss: a ten year retrospective analysis. Otol Neurotol 2003;24:728-33.*
25. *Tucci DL, Farmer JC, Kitch RD, Witsell DL. Treatment of sudden sensorineural hearing loss with systemic steroids and valacyclovir. Otol Neurotol 2002;23:301-8.*
26. *Cinnamon U, Bendet E, Kronenberg J. Steroids carbojen or placebo for sudden hearing loss: a prospective double blind study. Eur Arch Otorhinolaryngol 2001;258:477-80.*