American Journal of Otolaryngology–Head and Neck Medicine and Surgery 42 (2021) 102996

Contents lists available at ScienceDirect

American Journal of Otolaryngology–Head and Neck Medicine and Surgery

journal homepage: www.elsevier.com/locate/amjoto

Rised sudden sensorineural hearing loss during COVID-19 widespread

Vural Fidan [a,*], Okan Akin [b], Handan Koyuncu [c]

[a] Department of Otorhinolaryngology, Eskisehir City Hospital, Eskisehir, Turkey
[b] Department of Otorhinolaryngology, Ortadogu Hospital, Ankara, Turkey
[c] Department of Otorhinolaryngology, Yunus Emre Hospital, Eskisehir, Turkey

ARTICLE INFO

Keywords:
COVID-19
Hearing loss
Neuropathy

ABSTRACT

Background: Sudden sensorineural hearing loss (SSNHL) is commonly encountered in otolaryngologic practice. SARS-CoV-2 infection is typically marked by respiratory symptoms although neurologic manifestations of the disease have also been described.
Objective: We want to measure the incidence and clinical aspects of persons exhibiting in otolaryngology clinic (OC) with SSNHL during the COVID-19 widespread and in the constant interval of previous year.
Methods: We retrospectively inspected the medical information for admissions to OC in Eskisehir, Turkey, during the COVID-19 widespread to describe the patients SSNHL. Clinical knowledge was saved for each subject and corresponded with that of SSNHL subjects demonstrating in 2019.
Result: Between 1 April and 30 September 2020, 68 patients admitted to OC for SSNHL; in 2019, there were 41 subjects, for an incidence rate ratio of 8.5 per 100.000 (95% CI 1.02–2.92) for the 2020 cohort. Of the 2020 group, forty-one patients (60.3%) presented with active or recent symptoms consistent with COVID-19 infection, compared with four (9.8%) in 2019 ($p < 0.001$). Furthermore, subjects in 2020 group were younger (−15.5 years, $p = 0.0141$) than 2019 group and demonstrated prolonged interim (+1.7 days, $p < 0.001$) between SSNHL initiation and OC petition.
Conclusion: We detected increased incidence of SSNHL during the COVID-19 widespread compared to the same interval of the prior year; 60.3% of subjects confronting with SSNHL had signs that were harmonious with *COVID-19*.

1. Introduction

COVID-19 that is the name of the disease caused by the SARS-CoV2 virus remains to interrupt our lives as pandemic in 2020 (1). *COVID-19* is usually noticed by fever, cough, sore throat, headache, muscle pain, diarrhea, and dyspnea, although neurological presentations of COVID-19 have also been defined (2,3). Some reports have published that *COVID-19* could result cranial neuropathies such as anosmia and facial nerve palsy (4–6).

Sudden sensorineural hearing loss (SSNHL) is a hearing loss of at least 30 dB within 3 days and intervention is established a course of corticosteroids and hyperbaric oxygen therapy (7,8). The absolute majority of patients with SSNHL have no diagnosed reason for hearing loss and are assorted as idiopathic but the correlation with viral contagion has been declared (9). Moreover, there are few SSNHL case reports due to COVID-19. The immune mediated mechanism has been published as a suitable hypothesis for cranial neuropathies also many viruses such as coronavirus are acknowledged to be neurotropic hence there is the principle to estimate a connection between COVID-19 and SSNHL (10,11).

The purpose of this survey was to evaluate the change in the incidence and clinical aspects of subjects exhibiting with SSNHL during the COVID-19 widespread in Eskisehir to find associations between COVID-19 and SSNHL.

2. Methods

In this study, we retrospectively reexamined the medical documents of all patients with SSNHL between 1 April and 30 September 2020 and compared these findings with the medical documents of subjects with SSNHL 1 April and 30 September 2019.

The study was approved by the Local Ethical Committee.

For each subject, we assembled demographic and medical data. Also, we specifically examined the symptoms that the World Health

* Corresponding author at: Department of Otorhinolaryngology, Cavdarlar Street, Eskisehir 26080, Turkey.
E-mail address: vuralfidan@gmail.com (V. Fidan).

https://doi.org/10.1016/j.amjoto.2021.102996
Received 29 January 2021;
Available online 31 March 2021

Organization reported to be related to COVID-19 (fever, fatigue, myalgia, respiratory symptoms, headache, diarrhea, nausea or vomiting, loss of smell or taste) (12).

Official population data released in January 2019 and January 2020 were used to calculate the incidence of SSNHL.

The incidence measures were corresponded by computing the risk ratio (RR) with affiliated 95% confidence intervals (95% CI). SPSS 20.0 for Windows was used for statistical analysis.

Persistent variables were demonstrated as mean ± *standard deviation* and median, while frequencies and percentages were computed for categorical variables. We used Kolmogorov–Smirnov test to compare the two groups, and we used Student's *t*-test to compare mean values, and also we used the Fisher exact distribution to compare the frequencies of the remaining variables between two groups.

3. Results

Sixty-eight cases applied the otorhinolaryngology clinic for SSNHL during 1 April and 30 September 2020 (incidence ratio 8.5 subjects per 100,000 residents), while only 41 cases were discovered in the constant interval of 2019 using the constant clinic's medical documents (incidence ratio 5.2 subjects per 100,000 residents). There was a statistically significant incidence ratio in 2020 resembled to 2019. The principal characteristics of the two groups are resumed in Table 1.

In 2020, 41 out of 68 cases (60.3%) had an infectious manifestations at the time of appearance, corresponded with four out of 41 (9.10%) in 2019 ($p < 0.001$). Furthermore, the interim between the initiation of the SSNHL and the undertaking of medical acclaim was longer in the 2020 group (median = 2.3 days) than in the 2019 group (median = 0.6 days) ($p < 0.001$). There were not any difference in the ratio of chronic diseases or immunosuppressant treatment between two groups. Thirty-nine of sixty-eight patients were positive nasopharyngeal swabs for *SARS-CoV-2* (57.4%). All SSNHL subjects routinely were ordered 1 mg/kg/day oral methyl prednisolone for ten days but patients who were positive nasopharyngeal swabs for *SARS-CoV-2* were ordered 40 mg/kg/day oral favipiravir for five days.

4. Discussion

We inspected an increased manifestation of SSNHL in the widespread interval competed with the same interval of the previous year. Furthermore, 41 out of 68 patients (60.3%) whom applied to otorhinology clinic with SSNHL were presented to COVID-19 infection symptoms during COVID-19 widespread. These finding may fortify the relationship between acute mononeuropathies and COVID-19, as recently defined (4,5). Subjects pretended SSNHL during the COVID-19 widespread have found younger than same period of the previous year.

The entrance location of COVID-19 is respiratory tract. COVID-19 enrols in to cells by infiltrating to the angiotensin converting enzyme 2 (ACE2) in the respiratory tract. The midpoint of hearing is in the temporal part of brain. Besides, there is ACE2 in the temporal part of brain. Therefore, COVID-19 transmission may proceed critically. The virus induces excessive cytokine to be secreted when it dominates the temporal lobe or its neighbourhoods. Therefore, it can induce constant hearing impairment by enhancing oxidative destruction.

We know that COVID-19 is a life-threatening condition its own, also it has a secondary damaging outcome on other health problems due to the afflicted reply of an overcharged health organization (13,14). In addition, we believe the distress of engaging COVID-19 may cause patients to predate or retard demanding medical acclaim. The retardation of time between disease onset and application to hospital in patients with SSNHL during the COVID-19 outbreak confirms our theory. Treatment delay due to late application in sudden hearing loss also causes a decrease in the recovery rate of patients.

This survey has a restriction that all patients cannot be tested for COVID-19.

Table 1
Patients' characteristics.

		2019 year group Total $n = 41$	2020 year group Total $n = 68$	*p*-value
Sex: Number (%)	Male	22 (53.7%)	37 (54.4%)	0.318*
	Female	19 (46.3%)	31 (45.6%)	
Age: mean (±*SD*)		67.2 (±16.9)	51.7 (±18.6)	0.141**
Presence of infectious symptoms: Number (%)	Yes	4 (9.8%)	41 (60.3%)	<0.001*
	No	37 (90.2%)	27 (39.7%)	
Days from initiation to application to clinic: mean (±*SD*)		0.6 (±0.5)	2.3 (±1.7)	<0.001**
Chronic disease; Number (%)	Yes	14 (34.1%)	22 (32.4%)	0.452*
	No	27 (65.9%)	48 (67.6%)	
Immunosuppressive therapy (%)	Yes	2 (4.9%)	3 (4.4%)	0.837*
	No	39 (95.1%)	65 (95.6%)	

SD: Standard deviation.
* *p*-value for Fisher exact distribution.
** *p*-value for Student's t-distribution.

5. Conclusion

The main outcome we remarked was increased incidence of SSNHL during the COVID-19 widespread.

Currently, the most appropriate theory that explains the relationship between COVID-19 and cranial neuropathy is the neuroinvasion and autoimmunity theory (10).

But relationship between COVID-19 and neurological disorders has not been clearly defined. In order to explain this relationship, we need new studies including more subjects.

Ethics committee approval

The protocol of the study was approved by the local Institutional Review Board. The study protocol was in accordance with the 1964 Helsinki Declaration and its later amendments comparable ethical standards.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Information sharing

The data related to the article will be shared with the competent authorities when necessary.

CRediT authorship contribution statement

Conceptualization, Methodology, Investigation, Writing - Review & Editing: VF, OA, HK.

Visualization, Supervision, Formal analysis: VF.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Tufan A, Avanoğlu Güler A, Matucci-Cerinic M. COVID-19, immune system response, hyperinflammation and repurposing antirheumatic drugs. Turk J Med Sci 2020;50(SI-1):620–32. https://doi.org/10.3906/sag-2004-168. Apr 21.
[2] Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497–506.

[3] Vonck K, Garrez I, De Herdt V, et al. Neurological manifestations and neuro-invasive mechanisms of the severe acute respiratory syndrome coronavirus type 2. Eur J Neurol 2020;27(8):1578–87. https://doi.org/10.1111/ene.14329.
[4] Dinkin M, Gao V, Kahan J, et al. COVID-19 presenting with ophthalmoparesis from cranial nerve palsy. Neurology 2020;95(5):221–3. https://doi.org/10.1212/WNL.0000000000009700.
[5] Goh Y, Beh D, Makmur A, et al. Pearls and oy-sters: facial nerve palsy as a neurological manifestation of Covid-19 infection. Neurology 2020;95:364–7. https://doi.org/10.1212/WNL.0000000000009863.
[6] Helbok R, Beer R, Löscher W, et al. Guillain-Barré syndrome in a patient with antibodies against SARS-COV-2. Eur J Neurol 2020;27(9):1754–6. https://doi.org/10.1111/ene.14388.
[7] Madhok V, Gagyor I, Daly F, et al. Corticosteroids for Bell's palsy (idiopathic facial paralysis). Cochrane Database Syst Rev 2016;7:CD001942. https://doi.org/10.1002/14651858.CD001942.pub5.
[8] Eviston T, Croxson G, Kennedy P, et al. Bell's palsy: Aetiology, clinical features and multidisciplinary care. J Neurol Neurosurg Psychiatry 2015;86:1356–61. https://doi.org/10.1136/jnnp-2014-309563.
[9] Peitersen E. Bell's palsy: the spontaneous course of 2,500 facial nerve palsies of different etiologies. Acta Oto-Laryngologica Supplement 2002;122:4–30.
[10] Costello F, Dalakas M. Cranial neuropathies and COVID-19: Neurotropism and autoimmunity. Neurology 2020;95(5):195–6. https://doi.org/10.1212/WNL.0000000000009921.
[11] Natoli S, Oliveira V, Calabresi, et al. Does SARS-Cov-2 invade the brain? Translational lessons from animal models. Eur J Neurol 2020;27(9):1764–73. https://doi.org/10.1111/ene.14277.
[12] Yüce M, Filiztekin E, Özkaya KG. COVID-19 diagnosis -a review of current methods. Biosens Bioelectron 2021 Jan 15;172:112752. https://doi.org/10.1016/j.bios.2020.112752.
[13] Driggin E, Madhavan M, Bikdeli B, et al. Cardiovascular considerations for patients, health care workers, and health systems during the COVID-19 pandemic. J Am Coll Cardiol 2020;75:2352–71. https://doi.org/10.1016/j.jacc.2020.03.031.
[14] Roberton T, Carter E, Chou V, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. Lancet Glob Health 2020;8:e901–8. https://doi.org/10.1016/S2214-109X(20)30229-1.