NAILE JIKHASHVILI [1,2], NINO SHARASHENIDZE [3,4], IRAKLI KHUNDADZE [3,5]

THE DEVELOPMENT OF SENSORINEURAL HEARING LOSS IN PATIENTS WITH COVID-19: A CASES REPORT AND REVIEW

[1]Clinic "Kani", [2]BAU University, [3]Khechinashvili Clinic, [4]SDASU, [5]D.Tvildiani University

Doi: https://doi.org/10.52340/jecm.2023.03.07

ნაილე ჯიხაშვილი [1,2], ნინო შარაშენიძე [3,4], ირაკლი ხუნდაძე [3,5]

COVID-19 გადატანილ პაციენტებში სმენის დისფუნქციის შეფასება და აღწერა

[1]კლინიკა „კანი", [2]BAU-ს უნივერსიტეტი; [3]ხეჩინაშვილის სახელობის კლინიკა, [4]სდასუ;
[5]დ.ტვილდიანის სახელობის უნივერსიტეტი

რეზიუმე

კორონავირუსის დაავადება 2019 (COVID-19) პირველად ჩინეთში 2019 წლის დეკემბერში გამოვლინდა და ჯანდაცვის მსოფლიო ორგანიზაციამ (WHO) პანდემიად გამოაცხადა. ამ დაავადების სიმპტომები იყო ხველა, ყელის ტკივილი, ცხვირით გაძნელებული სუნთქვა, ყნოსვითი დისფუნქცია, ყველა ეს სიმპტომი ფართოდ იყო აღწერილი თანამედროვე ლიტერატურაში. ყნოსვითი და/ან გემოს დისფუნქციის გარდა SARS-CoV-2 ინფექციამ შეიძლება გამოიწვიოს ნევროლოგიური გართულებები, როგორიცაა სმენის დაქვეითება, ხმაური ყურებში და/ან თავბრუსხვევა.

კვლევის მიზანი იყო COVID-19 გადატანილ პაციენტებში სმენის დისფუნქციის შეფასება და აღწერა. 2022 წლის მარტიდან აგვისტომდე გამოკვლეული იყო 24 პაციენტი, მათ დაუდგინდათ მსუბუქი და საშუალო ხარისხის COVID-19, რაც დადასტურდა PCR-ტესტით. გამოჯანმრთელებიდან 2-3 კვირის შემდეგ პაციენტები ამბულატორიულად ეწვივნენ ოტორინოლარინგოლოგს ყურში ხმაურის და სმენის დაქვეითების ჩივილით. შედეგების შეფასება განხორციელდა პაციენტების ანამნეზის (სუბიექტური მონაცემები) და ოტოსკოპიის და აუდიომეტრიის მონაცემების (ობიექტური მონაცემები) გათვალისწინებით. აღსანიშნავია, რომ სმენის ფუნქციის დარღვევაში დაავადების სიმძიმე არ არის გადამწყვეტი და COVID-19 უსიმპტომო მიმდინარეობის შემთხვევაშიც კი, შეიძლება განვითარდეს ნეიროსენსორული სმენაჩლუნგობა და ტინიტუსი.

Introduction. Coronavirus disease 2019 (COVID-19) was first detected in China in December 2019 and declared a pandemic by the World Health Organization (WHO) on March 11, 2020 [1]. Coronavirus disease 2019 (COVID-19) has become a major pandemic.

Reported symptoms of COVID-19 included cough (67.8%), fever (43.8%), increased sputum production (33.7%), sore throat (13.9%), and nasal congestion (4.8%) [2]. Some patients had only hyposmia and dysgeusia as initial symptoms. Olfactory dysfunction (OD), including anosmia and hyposmia, is particularly pronounced among these symptoms in patients with COVID-19 and all these clinical symptoms are widely described in modern literature [3,4,5,6].

In addition to olfactory and/or gustatory dysfunction, SARS-CoV-2 infection can lead to neurological complications such as hearing loss, tinnitus, and/or dizziness. Despite extensive research, the mechanisms and duration of the diverse neurological symptoms of COVID-19 remain unclear, as do the pathogenesis that may underlie them. Direct toxic damage to the central nervous system, as well as immunological and hypoxic mechanisms, have been discussed in connection with SARS-CoV-2 [7]. But the impact of COVID-19 on the auditory system has received little attention so far.

In this article, we would like to consider the complaints and symptoms associated with the auditory function that occur in the post-infection period in patients who have had this disease. And also, to investigate and characterize the symptoms - tinnitus and hearing loss that occur after the elimination of coronavirus infection, and their relationship with the severity of the disease.

Materials and methods. The aim of the study was to evaluate, investigate and characterize the presence of symptoms such as tinnitus and sensorineural hearing loss in patients who had Covid-19, and to identify the relationship of these symptoms with the severity of the disease.

We retrospectively analyzed from the period March-August 2022 the subjective and objective data of 24 patients who consulted a laryngologist with complaints of tinnitus and/or hearing loss after covid-

19. In all patients, the diagnosis of Covid-19 was confirmed by a PCR test. The severity of the disease was mild to moderate.

Patients turned to the laryngologist with the corresponding complaints on an outpatient basis, 2-3 weeks after infection. Patients were evaluated taking into account subjective (history and complaints of patients) and objective (otoscopic picture, tone audiometry) data.

Results. A total of 24 patients (14 women and 10 men) with complaints of tinnitus and/or hearing loss were studied, aged 18 to 75 years.

Of these, only 6 patients aged 18 to 32 complained of tinnitus after suffering from covid-19. There were no hearing complaints in these patients. The objective data of these patients corresponded to the norm, i.e., otoscopic picture and audiogram were within normal limits. The symptom of tinnitus in these patients appeared during the illness and persisted in the period after recovery.

Among those studied, 14 patients aged 45 to 75 complained of hearing loss and tinnitus immediately after covid-19 disease. Notably, these patients did not complain of hearing or tinnitus prior to covid-19. The otoscopic picture was within the normal range. But on the audiogram, there was mild or moderate hearing loss of the neurosensory type.

And only in 4 patients aged 68 to 75 years there was a deterioration in hearing and a change in the height of tinnitus in the post-infection period. These patients were diagnosed with mild to moderate sensorineural hearing loss prior to covid-19. The otoscopic picture was within the normal range. The audiogram in all cases showed sensorineural hearing loss. Only one patient had the opportunity to compare both audiograms (the new one taken after the illness and the old one made 2 years before the disease), where there was a decrease in hearing by 10 dB compared to the original audiogram made 2 years before the illness.

Discussion. We know that common causes of acquired SNHL include: labyrinth infections, labyrinth or VIII nerve injury, ototoxic drugs, presbycusis, Ménière's disease, acoustic neuroma, and systemic disorders such as diabetes mellitus, hypothyroidism, kidney disease, autoimmune disease, etc. [8].

During the pandemic, it was repeatedly found in the literature that the course of COVID-19 infection can be complicated by a variety of neurological manifestations. Cases of sensorineural hearing loss (SNHL), tinnitus and/or dizziness have been described during and after exposure to COVID-19 [9].

To date, various hypotheses have been proposed to explain the etiopathogenesis of neurological symptoms that occur during the acute and post-acute phases of infection. Damage to the auditory-vestibular system during SARS-CoV2 infection may be associated with direct damage to the structures of the inner ear or with a virus-mediated immune response. Blood vessels, lymphatics and nerves, and in some cases the meninges (as suggested by Degen et al. [8]), have been proposed as entry routes for the virus [10].

Since the inner ear is vulnerable to viruses, sensorineural hearing loss (SNHL) occurs after infection with SARS-CoV-2, often leading to long-term morbidity and poor quality of life. The high level of chemosensory disturbances in patients with COVID-19 confirms the features of the neuroinvasiveness of SARS-CoV-2, and the olfactory nerve may represent the point of entry of the virus into the central nervous system [10-13], [abstract from Sensorineural Hearing Loss Post-COVID-19 Infection: An Update].

It is likely that many factors or a combination of mechanisms may be involved in the etiopathogenesis of various symptoms, including SNHL. They may consist of hypoxia, immune-mediated injury, coagulation disorders, and direct viral invasion/damage [14].

Despite the pathogenesis and various mechanisms of sensory hearing loss for the diagnosis of SNHL in the first place, a detailed history is necessary. It is important to know whether the disease is congenital or acquired, stationary or progressive, associated with other syndromes or not, involvement of other family members, and possible other etiological factors. An accurate history, including previous audiological events, is critical to guide the clinician in determining etiopathogenesis. To confirm this disease, it is necessary to determine the severity of deafness (mild, moderate, moderate, severe, deep or total). This can be clarified with audiometry. And also, an important role is played by determining the location of the lesion, i.e., cochlear, retrocochlear or central, which means CT or MRI of the temporal

bone, as well as a number of laboratory tests: blood tests (leukemia), blood sugar (diabetes), serology for syphilis, thyroid function (hypothyroidism), kidney function tests and etc.

And all of these actions are aimed at early detection of SNHL, as steps can be taken to halt its development, reverse or halt it, or start an early rehabilitation program much needed for communication (lectures).

Before postulating an association with SARS-CoV-2, the above should always be ruled out and a temporal correlation between infection and onset of hearing loss should be established. If there is one, then at the peak of the infection, hearing loss is likely to occur, the bright signs of which are high fever and malaise. Probably, during this period, the hematolabyrinth barrier is destroyed. Sometimes an antigen-antibody complex or an immune response to a viral infection can cause sensory hearing loss during the downstream course of the infection. Thus, the onset of hearing loss within 3 or 4 weeks of Covid-19 disease may be due to infection [15] which requires a more detailed study of the relationship between these two diseases.

Conclusions. One of the causes of hearing loss and, in particular, sensorineural hearing loss are viral and bacterial diseases. Accordingly, COVID-19, as a viral infection, and SARS-CoV-2 are the cause of sensorineural hearing loss and tinnitus. It is noteworthy that the severity of the course of the coronavirus infection is not decisive in the development of disturbances in the sound-conducting function. That is, even with a mild course of COVID-19, the virus can adversely affect the organ of hearing, leading to tinnitus and hearing loss.

To diagnose sensorineural hearing loss and identify a connection with Covid, a detailed history taking is necessary, it is imperative to conduct audiometry and, if necessary, determine the location of a possible lesion, perform CT and MRI. In patients with a previous diagnosis of non-sensory hearing loss, a comparison of the early and new audiograms is necessary to determine the level of hearing loss.

Further study of the relationship between Covid and sensory hearing loss is necessary for timely diagnosis and initiation of treatment in order to avoid hearing loss in patients and the development of tinnitus, which leads to a deterioration in the quality of life.

References:

1. Khaled Habas, Chioma Nganwuchu, Fanila Shahzad, Rajendran Gopalan, Mainulb Haque, Sayeeda Rahman, Anwarul Azim Majumder, Talat Nasim. Resolution of coronavirus disease 2019 (COVID-19), Expert Review of Anti-infective Therapy. 2020; 18-12, 1201-1211.
2. Chen-Yu Chien, Jeng-Yih Wu, Ling-Frng Wang. Proactive measures for the pandemic COVID-19 infection in outpatient clinics of Otolaryngology Department. The Kaohsiung Journal of Medical Sciences. 2020; 36(6):473-474.
3. Xiangming Meng, Yanzhong Deng, Zhiyong Dai, Zhisheng Meng COVID-19 and anosmia: A review based on up-to-date knowledge. Am J Otolaryngol. 2020 September-October, 41(5):102581.
4. Guan W.J., Ni Z. Y., Hu Y., Liang W. H., Ou C. Q., He J.X., Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020; 382: 1708-1720. doi:10.1056/NEJMoa2002032
5. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, Chang J, Hong C, Zhou Y, Wang D, Miao X, Li Y, Hu B. Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. JAMA Neurol. 2020 Jun 1;77(6):683-690. doi: 10.1001/jamaneurol.2020.1127.
6. Marchese-Ragona R., Ottaviano G., Nicolai P., Vianello A., Carecchio M. Sudde hyposmia as a prevalent symptom of COVID-19 infection. medRxiv.2020 doi:10.1101/2020.04.06.20045393. Apr.7.
7. Chern, A., Famuyide, A.O., Moonis, G., Lalwani, A.K. Bilateral Sudden Sensorineural Hearing Loss and Intralabyrinthine Hemorrhage in a Patient with COVID-19. Otol. Neurotol. 2020, 42, e10–e14.
8. Degen C, Lenarz T, Willenborg K. Acute Profound Sensorineural Hearing Loss After COVID-19 Pneumonia. Mayo Clin Proc. 2020 Aug;95(8):1801-1803. doi: 10.1016/j.mayocp.2020.05.034.
9. Lamounier P, Franco Gonçalves V, Ramos HVL, Gobbo DA, Teixeira RP, Dos Reis PC, Bahmad F Jr, Cândido Costa C. A 67-Year-Old Woman with Sudden Hearing Loss Associated with SARS-CoV-2 Infection. Am J Case Rep. 2020 Nov 3;21:e927519. doi: 10.12659/AJCR.927519.

10. Ricciardiello, F.; Pisani, D.; Viola, P.; Cristiano, E.; Scarpa, A.; Giannone, A.; Longo, G.; Russo, G.; Bocchetti, M.; Coppola, C.; et al. Sudden Sensorineural Hearing Loss in Mild COVID-19: Case Series and Analysis of the Literature. Audiol. Res. 2021, 11:313–326.
11. Gerstacker K, Speck I, Riemann S, Aschendorff A, Knopf A, Arndt S. Deafness after COVID-19? HNO. 2021 Aug; 69(Suppl 2):92-95. doi: 10.1007/s00106-021-01041-0.
12. Shah S, Rocke J, France K, Izzat S. Sudden sensorineural hearing loss in COVID-19: A case series from the Wrightington, Wigan and Leigh Teaching Hospitals, United Kingdom. Med J Malaysia. 2021 Aug; 76(Suppl 4):55-59.
13. Pokharel S, Tamang S, Pokharel S, Mahaseth RK. Sudden sensorineural hearing loss in a post-COVID-19 patient. Clin Case Rep. 2021 Oct 17;9(10):e04956. doi: 10.1002/ccr3.4956.
14. Magro CM, Mulvey J, Kubiak J, Mikhail S, Suster D, Crowson AN, Laurence J, Nuovo G. Severe COVID-19: A multifaceted viral vasculopathy syndrome. Ann Diagn Pathol. 2021 Feb;50:151645. doi: 10.1016/j.anndiagpath.2020.151645.
15. Satar B. Criteria for establishing an association between Covid-19 and hearing loss. Am J Otolaryngol. 2020 Nov-Dec 2020; 41(6):102658. doi: 10.1016/j.amjoto.2020.102658.

NAILE JIKHASHVILI [1,2], NINO SHARASHENIDZE [3,4], IRAKLI KHUNDADZE [3,5]

THE DEVELOPMENT OF SENSORINEURAL HEARING LOSS IN PATIENTS WITH COVID-19: A CASES REPORT AND REVIEW

[1]Clinic "Kani", [2]BAU University, [3]Khechinashvili Clinic, [4]SDASU, [5]D.Tvildiani University

SUMMARY

Coronavirus disease 2019 (COVID-19) was first detected in China in December 2019 and declared a pandemic by the World Health Organization (WHO) on March 11, 2020. Reported symptoms were cough, sore throat, nasal congestion, and olfactory dysfunction and all these clinical symptoms were widely described in modern literature. In addition to olfactory and/or gustatory dysfunction, SARS-CoV-2 infection can lead to neurological complications such as hearing loss, tinnitus, and/or dizziness. Despite extensive research, the mechanisms and duration of the diverse neurological symptoms of COVID-19 remain unclear, as do the pathogenesis that may underlie them.

The aim of this study was evaluating and describe hearing disfunctions in post-Covid-19 patients. 24 patients were studied between March and August 2022. All patients were diagnosed with mild-to-moderate Covid-19, as confirmed by a PCR test. Recovered patients visited to the laryngologist on an outpatient basis 2-3 weeks after the disease with complaints of tinnitus and hearing impairment. The evaluation of the results was carried out taking into account the anamnesis of patients (subjective data) and otoscopy and audiometry data (objective data). It is noteworthy that the severity of the course of the coronavirus infection is not decisive in the development of disturbances in the sound-conducting function. That is, even with an asymptomatic course of COVID-19, the virus can adversely affect the hearing organ, leading to hearing loss and tinnitus.

Keywords: Covid-19, sensorineural, hearing loss, tinnitus