

Post Covid 19 SSNHL in Egypt

Kasem M. Kasem, Hamada F. Hashem, Mohamed I. Ezzat

Department of
Otorhinolaryngology, Faculty
of Medicine Benha
University, Egypt.

Corresponding to: Mohamed
I. Ezzat, Department of
Otorhinolaryngology, Faculty
of Medicine Benha
University, Egypt.

Email:

mohamed.ibrahem14@fmed.b
u.edu.eg

Received: 13 February 2023

Accepted: 15 March 2023

Abstract

Background: A growing body of evidence suggests that patients with the 2019 Coronavirus disease (COVID-19) have a risk of developing sudden sensorineural hearing loss (SSNHL). The pathogenesis of COVID-19-related SSNHL remains unclear. The aim of this study was to correlate the SSNHL to Covid 19 positive PCR patients. **Methods:** The study was designed as a prospective observational study on 200 who suffered from post-Covid acute SNHL among those attending to the post Covid19 clinic in Misr International Hospital in Giza Government. **Results:** According to Distribution of patients according to SNHL severity, 54 (27%) patients were mild, 23 (11.5%) Mild to moderate, 61 (30.5%) moderate, 14 (7%) Moderate to severe, 13 (6.5%) severe, 26 (13.5%) Severe to profound, and 9 (4.5%) profound. 193 (96.5%) of patients suffered from unilateral SNHL. Regarding Associated Audio-vestibular Signs and symptoms, 134 (67%) suffered from Tinnitus, 19 (9.5%) from Vertigo, 13 (6.5%) from Dizziness, 8 (4%) from Ear pain and 3 (1.5%) Facial nerve palsy. 110 (55%) of patients were treated by Systemic steroids, 29 (14.5%) by Local steroids, 27 (13.5%) by Combined local and systemic steroids and 34 (17%) by other treatment (contraindicated to steroids). SNHL prognosis, patients who received Combined Local and systemic steroids was with the best prognosis. There was a statistically significant difference in patients' prognosis according to type of treatment. **Conclusion:** the audiovestibular system can be affected by SARS-COV-2 resulting in sudden sensorineural hearing loss (SSNHL) which can be reversible by combined local and systemic steroid therapy with good prognosis.

Key words: Post Covid 19 - SSNHL - Egypt

Introduction:

The COVID-19 pandemic represents an enormous global health crisis, because the crisis requires large-scale behavior changes and load significant psychological burdens on individuals. Insights from the social and behavioral sciences can be used to help organize human behavior with the recommendations of epidemiologists and public health experts (1).

In consideration of the possibility of the pandemic, scientists and physicians have been trying to grasp this emerging virus and its pathophysiology to recognize potential therapeutic protocols and to find therapeutic agents and vaccinations that help in disease management. (2).

Clinical description from corona virus disease 2019 (COVID-19) outbreak in China reveals that most patients (81%) present with influenza-like illness (ILI) or mild pneumonia, and 19% of cases have severe or critical pneumonia (3).

SSNHL is mostly defined as a sensorineural hearing loss of at least 30 decibels (dB) at three consecutive frequencies, occurring within a timeframe of 72 hours. It can affect any age group, but mostly occurs in patients aged 40-60 years. In the majority of cases, adequate investigation does not reveal any underlying cause (eg, vestibular

Schwannoma, stroke, malignancy, and exposure to noise or ototoxic medication), so that the SSNHL is considered as idiopathic.

(4)

First, SSNHL has often been associated to viral infection. Serological techniques such as PCR and immunoglobulin detection have previously been used to confirm viral load in patients with SSNHL. However, a direct causality between acute viral infection and SSNHL remains uncertain since in vivo sampling of inner ear fluid is potentially harmful. Second, vascular impairment is suggested as a cause of SSNHL. Both cardiovascular risk factors and virally induced hypercoagulability or inflammatory edema can theoretically lead to cochlear ischemia with subsequent hearing loss. (5).

The aim of this work was to correlate the SSNHL to Covid 19 positive PCR patients.

Patients and Methods

Study design

The study was designed as a prospective observational study on 200 patients who suffered from post-covid acute SNHL among those attending to the post Covid19 clinic in Misr International Hospital in Giza

Government since from January 2022 to July 2022.

Inclusion criteria

- Over 18 years old
- Any gender
- Previous Positive PCR Covid 19 swab

Exclusion criteria

- Patients complained from hearing loss before Covid 19 outbreak
- past history of tinnitus, dizziness
- Patients with previous history of ear surgery
- Patients with previous history of ear pathology
- Patients who get ototoxic drugs

Type of study

- Prospective observational study

For all patients:

- Full History: ear disease, ear operations, any medications affecting hearing
- Symptoms encountered throughout the course of the disease, medications used, and intensive care unit (ICU) admission if any.
- For cases with a previous history of COVID, history of complications or other system affection was added.

- History of medical illness
- Full Examination:-
 - General Examination
 - Local Examinations
 - Tympanometry.
 - Pure tune audiometry
- All Co-morbidities were recorded
- Labs were recorded specially "CBC, D Dimer& Ferritin"
- Patients were monitored every month

Study period:

- 6 months .

Sample setting:

- Misr International Hospital "Post-Covid19 clinic"

COVID diagnosis

- Diagnosis of COVID was done by referral doctor (typical symptoms and investigations; computerized topography (CT) and laboratory investigations and polymerase chain reaction (PCR)) and explored from the patient by history taking or from the referral letter from the referral doctor. Investigations used included CT chest representing the common radiological appearance and laboratory investigations including the complete blood count (CBC), D-dimer, and CRP.

➤ All patients were within the mild or moderate degree of the COVID. According to Parasher [16], patients were categorized into mild, moderate, or severe according to the symptoms on a presentation whereas mild-to-moderate cases are those presented with symptoms such as fever, persistent dry cough, body aches, and occasional breathlessness.

SSNHL diagnosis

➤ SSNHL was defined as sensorineural hearing loss of 30 decibels in hearing level (dB HL) at >2 consecutive frequencies which arose within 72 hours (6).

➤ All patients received standard audiological testing and were treated for SSNHL following standard care protocols

➤ Pure-tone audiometry was performed conforming to ISO 8253 norms as described by the Dutch Society for Audiology.

➤ Pure-tone thresholds were determined with adequate masking in case of possible overhearing. In case of confirmed SSNHL, patients were treated as soon as possible with oral corticosteroids (OCS) unless there were contra-indications

➤ In that case the patient received no treatment. OCS consisted of 1 mg/ kg/day

prednisolone once daily, with a maximum of 60 mg daily for 7 to 14 days.

➤ All patients were re-evaluated with new audiological testing which was scheduled 2 weeks after the first diagnosis.

➤ Salvage therapy with ITC was offered to patients with SSNHL with no or incomplete hearing recovery after OCS.

➤ ITC therapy was started within 4 weeks after failure of OCS, and consisted of dexamethasone 10 mg/ml 0.4 to 0.8 ml with three or four sessions in total every 3 to 7 days.

Ethical Approval:

Before beginning the research, the study was approved by the Faculty Ethics Committee of Misr International Hospital in Giza. A medical consent was taken from every patient. This study was designed to coincide with the Code of Ethics of the World Medical Association Ethical Approval (Declaration of Helsinki) for studies involving humans. {MS: 24.12.2021}

Statistical analysis:

After estimating the sample size, a statistical power analysis was carried out, based on results obtained from this study (N = 18) post Covid-19 subjects. The data collected were reviewed, coded and

statistically analyzed using SPSS program (statistical package of social science; SPSS Inc., Chicago, IL, USA) version 20 for Microsoft Windows. Statistical analysis was performed using two types of statistics: descriptive and analytical. A student's t test was used to test quantitative data. The Chi-square test was used for comparing categorical variables. The significance level was set at the P value \leq of 0.5.

Results:

According to Distribution of patients according to SNHL severity, 54 (27%) patients were mild, 23 (11.5%) Mild to moderate, 61 (30.5%) moderate, 14 (7%) Moderate to severe, 13 (6.5%) severe, 26 (13.5%) Severe to profound and 9 (4.5%) profound. 193 (96.5%) of patients suffered from unilateral SNHL **Table (1)**.

Regarding Associated Audio-vestibular Signs and symptoms, 134 (67%) suffered from Tinnitus, 19 (9.5%) from Vertigo, 13 (6.5%) from Dizziness, 8 (4%) from Ear pain and 3 (1.5%) Facial nerve palsy **Table (2)**.

Clinical presentation of patients of post Covid syndrome other than that related to SNHL was Post-COVID fatigue and neuropathy in 28 (14%) patients , Vertigo and headache in 4 (8%) patients, Flaring of asthma in 4 (8%) patients, Anxiety symptoms in 9 (18%) patients, Arthralgia/Muscle pain in 3 (6%) patients, Skin lesions in 1 (2%) patients, Dry cough in 4 (8%) patients, Chronic dyspnea in 5 (10%) and Low-grade fever in 1 (2%) patients **Table (3)**.

According to treatment, 110 (55%) of patients were treated by systemic steroids, 29 (14.5%) by local steroids, 27 (13.5%) by combined local and systemic steroids and 34 (17%) by other treatment (contraindicated to steroids) **Table (4)**.

Regarding SNHL prognosis, patients who received Combined Local and systemic steroids was with the best prognosis. There was a statistically significant difference in patients' prognosis according to type of treatment **Table (5)**.

Table (1) Distribution of patients according to SNHL side and severity

Distribution of patients according to SNHL severity	Mild	54 (27%)
	Mild to moderate	23 (11.5%)
	Moderate	61 (30.5%)
	Moderate to severe	14 (7%)
	Severe	13 (6.5%)
	Severe to profound	26 (13.5%)
	Profound	9 (4.5%)
Side	Unilateral	193 (96.5%)
	Bilateral	7 (3.5%)
Total		200 (100%)

Table (2) Associated Audio-vestibular Signs and symptoms

Audio-vestibular Signs and symptoms	Tinnitus	134 (67%)
	Vertigo	19 (9.5%)
	Dizziness	13 (6.5%)
	Ear pain	8 (4%)
	Peripheral nerve palsy	3 (1.5%)
Total		177 (88.5%)

Table (3) Other Post Covid Signs and symptoms

Other Post Covid Signs and symptoms	Post-COVID fatigue and neuropathy	7 (14%)
	Headache	4 (8%)
	Flaring of asthma	4 (8%)
	Anxiety symptoms	9 (18%)
	Arthralgia/Muscle pain	3 (6%)
	Skin lesions	1 (2%)
	Dry cough	4 (8%)
	Chronic dyspnea	5 (10%)
	Low-grade fever	1 (2%)
Total		50 (100%)

Table (4): Lines of treatment of postcovid SNHL in all studied patients

Lines of treatment of post Covid SNHL	Systemic steroids	110 (55%)
	Local steroids	29 (14.5%)
	Combined local and systemic steroids	27 (13.5%)
	other treatment (contraindicated to steroids)	34 (17%)
Total		200 (100%)

Table (5) : SNHL prognosis in all cases

	Systemic steroid	Local steroids	Combined Local and systemic steroids	Other treatment	Total	X2	P
Complete recovery	74 (67.3%)	21 (72.4%)	22 (81.5%)	8 (23.5%)	125 (62.5%)	48.17	< 0.0001
Improved	12 (10.9%)	2 (6.9%)	2 (7.4%)	19 (55.9%)	35 (17.5%)		
Not improved	14 (12.7%)	5 (14.2%)	2 (7.4%)	4 (11.8%)	25 (12.5%)		
Worsened	10 (9.1%)	1 (3.4%)	1 (3.7%)	3 (8.8%)	15 (7.5%)		

Discussion

According to Distribution of patients according to SNHL severity, 54 (27%) patients were mild, 23 (11.5%) Mild to moderate, 61 (30.5%) moderate, 14 (7%) Moderate to severe, 13 (6.5%) severe, 26 (13.5%) Severe to profound and 9 (4.5%) profound. 193 (96.5%) of patients suffered from unilateral SNHL.

Regarding Associated Audiovestibular Signs and symptoms, 134 (67%) suffered from Tinnitus, 19 (9.5%) from Vertigo, 13 (6.5%) from Dizziness, 8 (4%) from Ear pain and 3 (1.5%) facial nerve palsy.

Vertigo or dizziness has recently been described as a clinical manifestation of neuroinvasive characteristics of COVID19 as a result of acute labyrinthitis, vestibular neuritis, acute otitis media, or secondary to stroke following COVID19 (7)

In their study they reported balance disorders in 18.4% of their cases after COVID19 diagnosis with 94.1% reported dizziness and 5.9% reported acute vertigo attacks. Benign paroxysmal positional vertigo has been clinically reported in few COVID19 patients. It could be related to prolonged hospitalization and bed rest that may contribute to otolith detachment. Vestibular neuritis had been reported with COVID19 (8).

In their study they reported 0.08% incidence of facial palsy in COVID19 patients which increase to 8.6% in patients with previous history of facial palsy (9). In their study they reported positive CoVID19 IgG and IgM in 24.3% of facial palsy patients who are asymptomatic or had no history of COVID19 (10).

Clinical presentation of patients of post COVID syndrome other than that related to SNHL was PostCOVID fatigue and neuropathy in 28 (14%) patients, Vertigo and headache in 4 (8%) patients, Flaring of asthma in 4 (8%) patients, Anxiety symptoms in 9 (18%) patients, Arthralgia/Muscle pain in 3 (6%) patients, Skin lesions in 1 (2%) patients, Dry cough in 4 (8%) patients, Chronic dyspnea in 5 (10%) and low grade fever in 1 (2%) patients

According to treatment, 110 (55%) of patients were treated by Systemic steroids, 29 (14.5%) by Local steroids, 27 (13.5%) by Combined local and systemic steroids and 34 (17%) by other treatment (contraindicated to steroids)

Regarding SNHL prognosis, patients who received Combined Local and systemic steroids was with the best prognosis. There was a statistically significant difference in patients' prognosis according to type of treatment.

The estimated prevalence of hearing loss in COVID19 infection is about 7.6% which should be interpreted with caution as most studies used medical records or self-reported symptoms through telephone call or

questionnaires without appropriate audiovestibular evaluation due to home isolation of patients **(11)**.

In their study they reported that HL range from mild to profound **(12)**. In their study they reported elevated hearing thresholds at 1000, 2000, 4000, and 8000Hz in patients with mild COVID19 symptoms. They also reported that the hearing thresholds were worsened in patients with moderate severe forms of the disease. Other authors confirmed the association between hearing deterioration and the severity of CoVID19 **(13)**.

Several authors reported sudden SNHL (SSNHL) in COVID19 patients without prior otologic problems or use of ototoxic medication. Regarding the possible mechanism of HL in COVID19 patients, Cure and Cure suggested the binding of the CoVID19 virus to the ACE2 which has high level in the central auditory areas in the temporal lobe. This increases the viral load in the tissue induces the release of cytokine followed by oxidative stress condition and irreversible HL **(14)**

Tissue hypoxia occurs as a result of low oxygen release from the RBCs with further cellular damage. The presence of ACE2 in

the vascular smooth muscles made SARCov2 virus to increase the risk of thrombosis. Hearing loss is probably irreversible as it involves damage to central auditory structures secondary to ischemia or to thrombosis (14)

In their study they proposed that the relationship between HL (after careful exclusion of other causes of HL) and COVID-19 could be confirmed if HL occurs in patients with confirmed COVID19 diagnosis using PCR or IgM antibody titers or pulmonary CT scan. The onset of HL should occur within 3 or 4 weeks of COVID19 infection in association with some vestibular symptoms (15).

The elderly people have high incidence of comorbidity such as hypertension, atherosclerosis, and diabetes mellitus which increase their risk for thrombosis and the occurrence of HL with their COVID19 infection (14)

In an interesting finding, In their study they reported significantly elevated high frequency pure tone thresholds in asymptomatic cases in addition to the reduced amplitudes of transient evoked otoacoustic emissions (TEOAEs) when compared with non-infected subjects (15).

More recently, in their series, they reported absent OAEs in COVID19 patients suggesting OHCs damage in COVID19 disease (12).

Conclusion:

Our results showed the audiovestibular system can be affected by SARS-COV-2 resulting in sudden sensorineural hearing loss (SSNHL) which can be reversible by combined local and systemic steroid therapy with good prognosis.

References:

1. **Van Bavel J. J., Baicker K., Boggio P. S., Capraro V., Cichocka A., Cikara M., et al. (2020)**"Using social and behavioural science to support COVID-19 pandemic response", *Nature human behaviour*, 4(5), pp. 460–471.
2. **Amawi H., Abu Deiab G. A. I., Aljabali A. A., Dua K., and Tambuwala M. M. (2020)** "COVID-19 pandemic: an overview of epidemiology, pathogenesis, diagnostics and potential vaccines and therapeutics", *Therapeutic delivery*, 11(4), pp. 245–268.
3. **Wu Z., and McGoogan J. M. (2020)**"Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention", *Jama*, 323(13), pp. 1239–1242.
4. **Chandrasekhar SS, Tsai Do BS, Schwartz SR, Bontempo LJ, Faucett EA, Finestone**

- SA., et al (2019)** Clinical practice guideline: sudden hearing loss (update). *Otolaryngol Head Neck Surg* 161(1_suppl):S1–S45
6. **ElineBeckers , Pascale Chouvel, ValérieCassetto, and Vincent Mustin (2021)**"Sudden sensorineural hearing loss in COVID-19: A case report and literature review
7. **Stachler RJ, Chandrasekhar SS, Archer SM., Rosenfeld RM., Schwartez SR., Barrs DM., et al.** Clinical practice guideline: sudden hearing loss. *Otolaryngol Head Neck Surg* 2012;146:S1–35.
8. **Saniasiaya J, Kulasegarah J (2020)** Auditory cinchonism in COVID Era. *Ear Nose Throat J* 99(9):597–598
9. **Viola P, Ralli M, Pisani D, Malanga D, Sculco D, Messina L., et al (2021)** Tinnitus and equilibrium disorders in COVID-19 patients: preliminary results. *Eur Arch Otorhinolaryngol* 278(10):3725–3730
10. **Tamaki A, Cabrera CI, Li S, Rabbani C, Thuener JE, Rezaee RP., et al (2021)** Incidence of Bell palsy in patients with COVID-19. *JAMA Otolaryngol Head Neck Surg* 147(8):767–768
11. **Islamoglu Y, Celik B, Kiris M (2021)** Facial paralysis as the only symptom of COVID-19: a prospective study. *Am J Otolaryngol* 42(4):102956
12. **Almufarrij I, Uus K, Munro KJ (2020)** Does coronavirus affect the audiovestibular system? A rapid systematic review. *Int J Audiol* 59(7):487–491
13. **Jeong M, Ocwieja KE, Han D, Wackym PA, Zhang Y, Brown A., et al (2021)** Direct SARS-CoV-2 infection of the human inner ear may underlie COVID-19-associated audiovestibular dysfunction. *Commun Med (London)* 1(1):1–14
14. **de Sousa Alves F, Pinto Costa R, Xará S, Nóbrega Pinto A, Almeida E, Sousa C (2021)** SARS-CoV-2 and hearing: an audiometric analysis of COVID-19 hospitalized patients. *J Otolaryngol* 16(3):158–164
15. **Gabr T., Kotait M., & Moaty A. S. (2022).** Audiovestibular and vaccination complications of COVID-19. *The Egyptian Journal of Otolaryngology*, 38(1), 1-8.
16. **Mustafa MWM (2020)** Audiological profile of asymptomatic Covid-19 PCR-positive cases. *Am J Otol* 41(3):102483.

To cite this article: Kasem M. Kasem, Hamada F. Hashem, Mohamed I. Ezzat. Post Covid 19 S SNHL in Egypt. *BMFJ* 2023;409annual conference issue):225-234.