

# Sudden sensorineural hearing loss in COVID-19 patient with hearing improvement

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(CASE REPORT)



## Sudden sensorineural hearing loss in COVID-19 patient with hearing improvement

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### Abstract

**Introduction:** Sudden Sensorineural Hearing Loss (SSNHL) is a newly revealed clinical manifestation in COVID-19 patients. This is because corona virus is thought to cause auditory neuropathy spectrum disorders, inflammation, hypoxia due to erythrocyte deoxygenation, ischemia due to vascular occlusion, and immunological reactions that induce cellular stress pathways in peripheral to central auditory organs.

**Case:** A case of SSNHL in patient who were confirmed positive for PCR swab. A 66-year-old man with severe COVID-19, with hypertension and DM, had moderate right SNHL, left severe SNHL, when the PCR swab result was negative. Therapy received: methylcobalamin, ginkgobiloba, HBOT, and the hearing was improved.

**Conclusion:** SSNHL was obtained in COVID-19 patient.

**Keywords:** SSNHL; COVID-19; Auditory neuropathy; Diabetes

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### 1 Introduction

The novel coronavirus, known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), is known causing numbers of pneumonia cases that occurred in December 2019 in Wuhan, China. The World Health Organization (WHO) in January 2020 declared the coronavirus outbreak a pandemic that requires international attention. WHO has named this corona virus as Corona Virus Disease 2019 (COVID-19). Sudden Sensorineural Hearing Loss (SSNHL) is a clinical manifestation that has recently been revealed in COVID-19 patients, in addition to general symptoms such as fever, cough, shortness of breath, sore throat, headache, muscle aches, and disturbances of smell (anosmia) and taste (ageusia).<sup>1-3</sup> Corona virus is thought to cause Auditory Neuropathy Spectrum Disorder (ANSO), inflammatory reactions, hypoxia due to erythrocyte deoxygenation, ischemia due to vascular occlusion, and immunological reactions or cross reactions that induce cellular stress pathways in the peripheral to central auditory organs.<sup>1,4-7</sup>

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The first case of SSNHL in a COVID-19 positive patient was reported in Thailand in April 2020.<sup>8</sup> There have been no reports of SSNHL cases in COVID-19 patients in Indonesia. It is expected that this case report will provide knowledge that SSNHL may occur in COVID-19 cases, so it is necessary to screen for post-COVID-19 hearing loss, so that SSNHL can be handled immediately.

### 2 Case

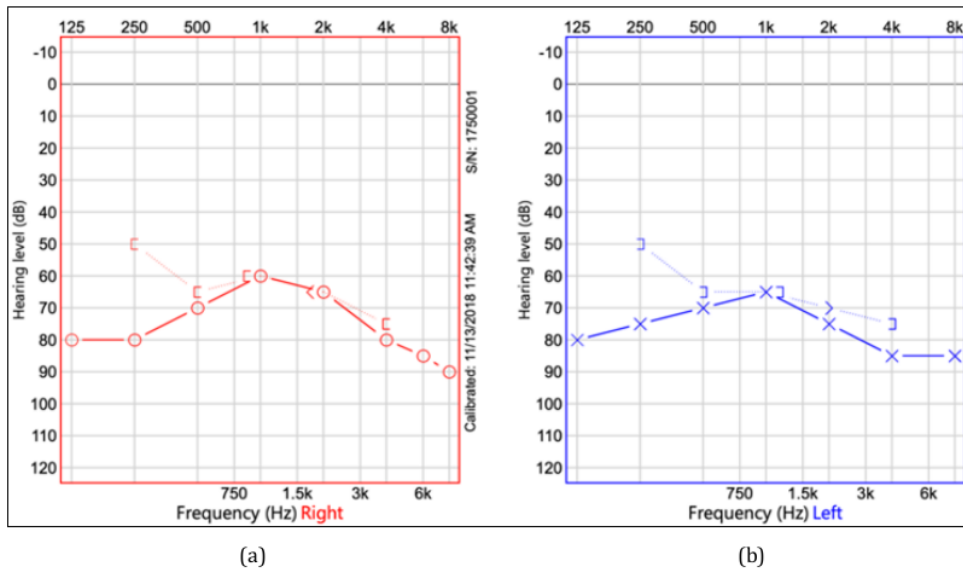
A 66-year-old man, came to the ENT Clinic, St. Vincentius A Paulo Hospital, Surabaya, Indonesia, on September 14, 2020 with the chief complaint of hearing loss in both ears since the previous week. At the time, the result of COVID-19 PCR

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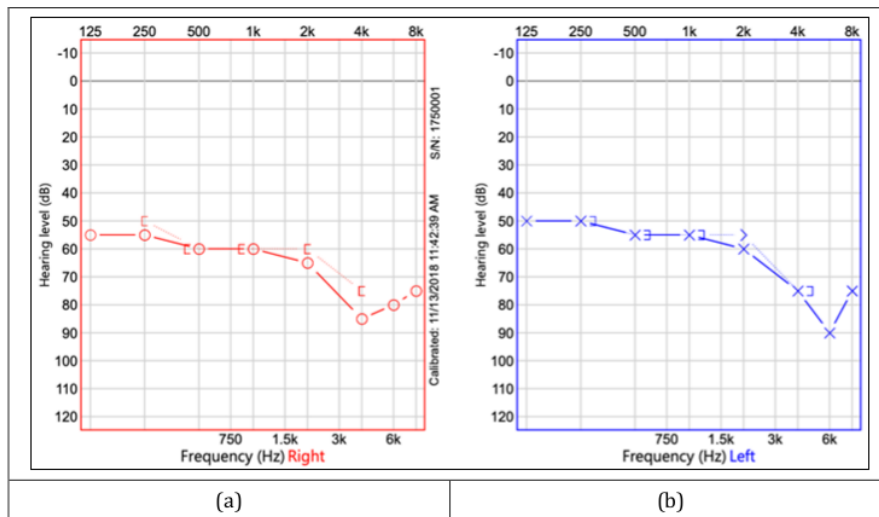
swab was already negative. No ringing in the ears and no complaints of spinning dizziness. On otoscopy, the AEC of right and left ears was within normal limits, the TM was intact. Two months earlier, the patient was hospitalized for one and a half months with a diagnosis of COVID-19 pneumonia, with co-morbidities of diabetes mellitus (DM) and hypertension. Complaints upon admission to the hospital were shortness of breath and fever for one day, painful swallowing for several days, and no appetite for two weeks. The general condition of the patient was s weak, still in compos mentis. The oxygen saturation was 93%. Chest radiograph showed bilateral and multifocal pneumonia, which two weeks later was accompanied by a left pleural effusion. The drugs received during treatment were bromhexine hydrochloride injection, pantoprazole, tocilizumab, dexamethasone, paracetamol, oseltamivir, montelukast, enoxaparin sodium, megestrol syrup, acetylcysteine, valsartan, norvask, sulfonyleureas, linagliptin, warfarin, ISDN, and probiotics. The patient also received convalescent plasma therapy. No ototoxic drugs were administered.

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Initial audiogram of the second patient was moderate-severe SNHL in the right ear with a PTA of 68.75 dB, and severe SNHL in the left ear, PTA of 73.75 dB (Figure 3). The patient received treatment with methylcobalamin and ginkgobiloba. The patient also underwent a series of Hyperbaric Oxygen Therapy (HBOT) for ten times.



**Figure 1** Initial audiogram of the second patient (a) right ear moderately severe SNHL, PTA 68.75 dB (b) left ear severe SNHL, PTA 73.75 dB

The next audiometry was performed one month apart, when the patient finished undergoing HBOT. The patient felt his hearing was improving and did not want to continue the HBOT. The audiogram showed right ear moderate-severe SNHL with a PTA of 67.5 dB, and left ear moderate-severe SNHL with a PTA of 61.25 dB (Figure 4).



**Figure 2** Audiogram a month after therapy, moderate severe SNHL (a) right ear with PTA 67.5 dB (b) left ear with PTA 61.25 dB

**Table 1** Hearing improvement in the patient.9

| PTA (dB)                     |       |       |
|------------------------------|-------|-------|
| Early                        | Right | 68.75 |
|                              | Left  | 73.75 |
| Post-therapy                 | Right | 67.5  |
|                              | Left  | 61.25 |
| Improvement                  | left  | 12.5  |
| Hearing improvement criteria | Good  |       |

### 3 Discussion

This SSNHL patient had been confirmed positive for COVID-19 with a PCR swab which is the gold standard for diagnosis of COVID-19. The clinical manifestations of COVID-19 infection are divided into five, i.e. asymptomatic, mild illness, moderate illness, severe illness, and critical illness.<sup>10</sup> The levels of severity of the disease have different symptoms, results of physical and diagnostic examinations. The incubation period is about four to five days. A total of 97.5% of patients had symptoms within 11.5 days after infection. Shortness of breath appears five to eight days after the initial symptoms that indicate worsening of the disease. According to the symptoms and the results of diagnostic examinations, this patient was classified as having severe illness. Sudden sensorineural hearing loss is more common in COVID-19 patients who experience other respiratory symptoms, such as fever, cough, sore throat, runny nose, anosmia and ageusia, which is 81.25% compared to COVID-19 patients who only have SSNHL symptoms (18, 75%).<sup>11</sup>

This patient experienced SSNHL when the PCR result was negative or two months from being positive for COVID-19. There are various opinions regarding association between SSNHL and COVID-19 infection, that it occurs within three to four weeks from the first exposure, and occurs at the peak of infection, when other systemic symptoms are also prominent. But there's also controversy says SSNHL can still be associated with COVID-19 even though it appears when there has been improvement in systemic symptoms, as in this patient.<sup>1</sup> A previous study from India reported the incidence of SSNHL in patients with positive PCR swab test results.<sup>11</sup> Whereas, some cases from Thailand, China, Iran,

Turkey, Egypt, and Germany, did not mention when the symptoms appeared, when the PCR swab was still positive or already negative.<sup>1,6</sup> A case report from the UK stated that SSNHL occurred more than a month after the patient was confirmed positive for COVID-19 and had been discharged from the Intensive Therapy Unit.<sup>6</sup>

According to a study in India from March to August 2020 that in 16 cases of SSNHL in COVID-19 patients, there were more male (68.75%) than female (31.25%) patients, as this patient also a male. Case reports in Germany and Turkey reported one male patient with SSNHL and COVID-19. This was different from the case report in Iran which reported more female patients SSNHL in COVID-19 patients.<sup>12</sup> One female was also reported as having SSNHL in Thailand.<sup>6</sup>

The age of the patient is 66 years, belonging to 51-72 year age group, which in a study in India, found to experience more SSNHL, as much as 56.25% compared to those in age group of 38-50 years of 43.75%.<sup>11</sup> A case report in Germany also showed one patient aged 60 years. This was different from the case reports from Iran with patients aged 22, 23, and 40 years old, and in Turkey with the age of 29 years.<sup>5</sup>

This patient had bilateral SSNHL. A study in India reported that SSNHL was more unilateral (87.5%) than bilateral (12.5%). Two patients had tinnitus, none with vertigo. A study in India found tinnitus in COVID-19 patients with SSNHL in only 31.25% of the patients, and vertigo in 18.75% of patients.<sup>11</sup>

This patient had a history of hypertension and diabetes, and did not consume any ototoxic drugs. Previous case reports from Thailand, China, Iran, Turkey, Egypt, and Germany do not rule out other possible causes of SSNHL in COVID-19 patients.<sup>1,13</sup> A study from India excluded patients with a previous history of hearing loss, use of ototoxic drugs, hydroxychloroquine, noise exposure, age-related hearing loss, measles, mumps, rubella, meningitis, syphilis, hypertension, thyroid disease, kidney disease, and DM.<sup>11</sup> A case report from the UK also stated that no ototoxic drugs were administered while the patient was undergoing treatment for COVID-19.<sup>6</sup> Hypertension and diabetes mellitus affect vascular condition of patients and also have impact on vascularization of the middle and inner ear. But a study found no correlation between hearing impairment with diabetes mellitus and with hypertension.<sup>14</sup>

The patient received methylcobalamin, ginkgobiloba and HBOT. Methylcobalamin, which is the vitamin B12, and ginkgobiloba, which is included in alternative medicine, are not currently included in the recommended treatment for SSNHL. Vitamins, minerals, supplements such as N-acetyl-cysteine, CoQ10, alternative medicines such as Chinese herbs, and acupuncture, are treatments that do not have scientific evidence, and are considered to be at risk of causing adverse interactions than standard treatment.<sup>4</sup> There have been no case reports that provided vitamin and supplement therapy to COVID-19 patients who had previous SSNHL.<sup>6</sup> Hyperbaric oxygen therapy is intended to increase oxygen supply to inner ear which is possibly ischemic.<sup>13</sup>

The COVID-19 pandemic has an impact on early detection and management of hearing impairment activities, and it increases the incidence of hearing impairment with changes in patterns of daily life hence education on early detection and management of hearing impairment is now needed to be conducted.<sup>15</sup>

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#### 4 Conclusion

A case of SSNHL was found in COVID-19 patient, hearing improvement was noted. This report can provide information regarding early detection, treatment, and improvement of hearing function. The COVID-19 pandemic has an impact on early detection and management of hearing impairment activities, it is necessary to screen for post-COVID-19 hearing loss, so that SSNHL can be handled immediately.

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#### Compliance with ethical standards

**Disclosure of conflict of interest**

No conflict of interest.

**Statement of informed consent**

Informed consent was obtained from all individual participants included in the study.

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