

1  
2  
3  
4 **The reversible tinnitus and cochleopathy followed first-dose**  
5  
6 **AstraZeneca COVID-19 vaccination**  
7  
8  
9  
10  
11  
12

13 Ping-Tao Tseng, MD<sup>a,b,c,1,\*</sup>, Tien-Yu Chen, MD<sup>d,e</sup>, Yu-Shan Sun, MD<sup>f,g</sup>, Yen-Wen Chen,  
14  
15 MD<sup>a</sup>, Jiann-Jy Chen, MD<sup>a,h,\*</sup>  
16  
17  
18  
19  
20

21 <sup>a</sup> Prospect Clinic for Otorhinolaryngology & Neurology, Kaohsiung City, Taiwan  
22  
23

24 <sup>b</sup> Department of Psychology, College of Medical and Health Science, Asia University,  
25  
26 Taichung, Taiwan  
27  
28  
29

30 <sup>c</sup> Institute of Biomedical Sciences, National Sun Yat-sen University, Kaohsiung, Taiwan  
31  
32

33 <sup>d</sup> Department of Psychiatry, Tri-Service General Hospital; School of Medicine, National  
34  
35 Defense Medical Center, Taipei, Taiwan  
36  
37

38 <sup>e</sup> Institute of Brain Science, National Yang Ming Chiao Tung University, Taipei 112,  
39  
40 Taiwan  
41  
42

43 <sup>f</sup> Division of Family Medicine, Department of Family and Community Medicine, Tri-  
44  
45 Service General Hospital, Taipei, Taiwan  
46  
47

48 <sup>g</sup> School of Medicine, National Defense Medical Center, Taipei, Taiwan  
49  
50

51 <sup>h</sup> Department of Otorhinolaryngology, E-Da Cancer Hospital, Kaohsiung, Taiwan  
52  
53  
54

55 <sup>1</sup>: contributed as first author  
56  
57

58 \*: contributed equally as corresponding author  
59  
60

1  
2  
3  
4  
5  
6 **Correspondence to:**  
7

8  
9  
10 Ping-Tao Tseng, MD  
11

12  
13 Prospect Clinic for Otorhinolaryngology & Neurology, Kaohsiung city, Taiwan  
14

15  
16 Address: Number 252, Nanzixin Road, Nanzi District, Kaohsiung City 811, Taiwan  
17

18  
19  
20 Telephone: +886-7-352-4100-15  
21

22  
23 Email: [ducktseng@gmail.com](mailto:ducktseng@gmail.com)  
24  
25  
26  
27  
28

29  
30 OR  
31

32  
33  
34  
35  
36 Jiann-Jy Chen, MD  
37

38  
39  
40 Prospect Clinic for Otorhinolaryngology & Neurology, Kaohsiung city, Taiwan  
41

42  
43 Address: Number 252, Nanzixin Road, Nanzi District, Kaohsiung City 811, Taiwan  
44

45  
46  
47 Telephone: +886-7-352-4100-13  
48

49  
50 Email: [jiannjy@yahoo.com.tw](mailto:jiannjy@yahoo.com.tw)  
51  
52  
53  
54  
55

56 **Learning Point for Clinicians**  
57

58  
59  
60 This case report aimed to remind the clinicians of the possibility of potential

1  
2  
3  
4 cochleopathy after the administration of the COVID-19 vaccine and to recommend  
5  
6 immediate steroid treatment. Because this adverse event was reversible and  
7  
8 recoverable, we still strongly recommend the continuation of the administration of  
9  
10 the COVID-19 vaccine.  
11  
12  
13  
14  
15  
16

17  
18 **Acknowledgment:**  
19

20  
21 The current case report had been edited by Elsevier Language Editing Services  
22  
23 on 11-May-2021 (Serial number: LE-211726-88899CF904E8). The current case report  
24  
25 had been approved by the Institutional Review Board of the Tri-Service General  
26  
27 Hospital, National Defense Medical Center (TSGHIRB No.: A202105107).  
28  
29

30  
31 **Funding source:**  
32

33  
34 The current case report did not receive any funding source.  
35  
36

37  
38 **Conflicts of Interest:**  
39

40  
41 The authors declare no conflict of interest.  
42  
43

44  
45 **Authorship:**  
46

47  
48 All authors had access to the data and a role in writing the manuscript  
49  
50

51 *Keyword: tinnitus; cochleopathy; COVID-19; vaccination; public health; adverse*  
52  
53 *reaction*  
54  
55  
56  
57  
58  
59  
60

**Abstract:**

The current case was the first report demonstrating a single case presenting with sudden-onset tinnitus and cochleopathy after his first dosage of the AstraZeneca COVID-19 vaccine. Audiometry revealed an abnormally high short increment sensitivity index. His tinnitus/cochleopathy was reversible and recoverable under conservative steroid management. The abnormality of the high short increment sensitivity index returned to the normal range after steroid management. This case report aimed to increase the cautionary awareness of clinicians concerning the potential adverse events of the AstraZeneca COVID-19 vaccine and the new onset of tinnitus/cochleopathy. In addition, immediate treatment is recommended for managing these patients after the onset of tinnitus/cochleopathy. Furthermore, due to the fact that the adverse event of new-onset tinnitus was reversible and recoverable, we still strongly recommend the continuation of the administration of the AstraZeneca COVID-19 vaccine, based on its merits and demerits.

### **Case report:**

Mr. A is a 37 y/o male who had a past history of glaucoma and had been regularly treated with latanoprost and brimonidine eyedrops. He did not have any previous problems associated with tinnitus. He underwent pure tone audiometry (PTA) on April 18, 2021 as part of his regular health exams, and the results were within the normal range (Figure 1A). He received the first-dose of the AstraZeneca COVID-19 vaccine at 11 am on April 30<sup>th</sup>, 2021 without any local infection/complication. The pre-injection evaluation revealed no evidence for pre-existing infections. However, he started to have intermittent, right ear, high-pitch tinnitus from 4 pm into the night on April 30<sup>th</sup>, 2021 with tinnitus handicap inventory (THI) score as 28. At midnight on April 30<sup>th</sup>, a high fever with chills and myalgia developed, with a poor response to 500 mg acetaminophen. Therefore, he visited the emergency department, wherein the laboratory data, including CBC/DC, Cre/GPT, PT/aPTT/fibrinogen/d-dimer, creatine kinase, and blood culture, were normal. The intermittent, right ear, high-pitch tinnitus progressed into continuous high-pitch tinnitus and disturbed the normal hearing of the patient. In addition, low-pitch right ear tinnitus also appeared intermittently. Moreover, the THI score increased to 46. He received an otolaryngologic inspection, which revealed no abnormal findings. The subsequent audiometry test at 1 pm on May 1<sup>st</sup>, 2021 revealed normal findings in the PTA (Figure 1A), but a high short increment sensitivity index (SiSi) was observed (Figure 1B). Under the impression of acute inflammatory cochleopathy, he was treated with one dose of 10mg intravenous dexamethasone and a three-day oral 5mg prednisolone three times per day. His fever and myalgia quickly subsided. In addition, the right ear high-pitch and low-pitch tinnitus completely subsided on May 3<sup>rd</sup>, 2021. The subsequent audiometry

1  
2  
3  
4 demonstrated that the patient had recovered well by 5 pm May 3<sup>rd</sup>, 2021 (Figure 1A  
5  
6 and 1B), with the THI score returning to 0. The COVID-19 real-time polymerase chain  
7  
8 reaction (RT-PCR) detection assay revealed negative findings throughout the entire  
9  
10 course of treatment.  
11  
12

13  
14 This is the first case report addressing the time-associated relationship between  
15  
16 new-onset tinnitus and the first dose injection of the AstraZeneca COVID-19 vaccine.  
17  
18 The potential adverse events of micro-thromboembolism by COVID-19 vaccine  
19  
20 would be less likely because steroids do not have any anti-thromboembolism effects.  
21  
22 In addition, Mr. A's PTA were normal throughout the entire course which did not  
23  
24 fulfill the definition of sudden sensorineural hearing loss.<sup>1</sup>  
25  
26  
27

28  
29 The pandemic of COVID-19 has been preliminarily found to be associated with  
30  
31 an increased incidence of tinnitus.<sup>2</sup> In our case, the treatment rationale may be  
32  
33 similar to the treatment rationale by Rahimi, V.<sup>3</sup> In the case report by Rahmi, V, the  
34  
35 authors provided high dosage intratympanic corticosteroid injections to induce  
36  
37 immunosuppression to treat a 60-year-old woman with sudden hearing loss and  
38  
39 acute onset tinnitus following her COVID-19 infection. When considering our case,  
40  
41 there was no infectious evidence to refute Mr. A's COVID-19 status, and his COVID-  
42  
43 19 rt-PCR results revealed a negative finding. Therefore, tinnitus symptoms and  
44  
45 impaired SiSi would be less likely to be associated with an actual COVID-19 attack.  
46  
47 This case report aimed to recommend immediate steroid treatment for the  
48  
49 management of patients of new-onset tinnitus/cochleopathy after the COVID-19  
50  
51 vaccination. Furthermore, due to the fact that the adverse event of new-onset  
52  
53 tinnitus was reversible and recoverable, we still strongly recommend the  
54  
55 continuation of the administration of the AstraZeneca COVID-19 vaccine, based on  
56  
57 its merits and demerits.  
58  
59  
60

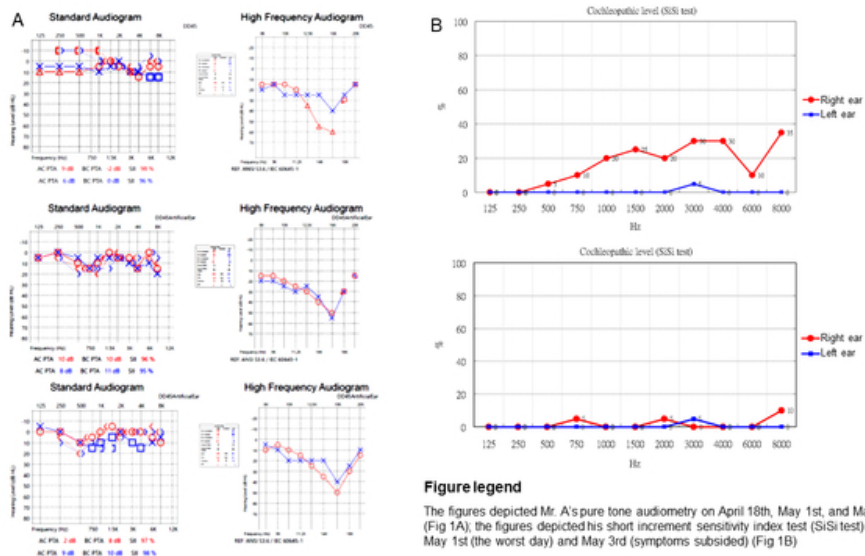
**References:**

1. Kuhn M, Heman-Ackah SE, Shaikh JA, Roehm PC. Sudden sensorineural hearing loss: a review of diagnosis, treatment, and prognosis. *Trends Amplif* 2011; **15**(3): 91-105.
2. Jafari Z, Kolb BE, Mohajerani MH. Hearing Loss, Tinnitus, and Dizziness in COVID-19: A Systematic Review and Meta-Analysis. *Can J Neurol Sci* 2021: 1-33.
3. Rahimi V, Asiyabar MK, Rouhbakhsh N. Sudden hearing loss and coronavirus disease 2019: the role of corticosteroid intra-tympanic injection in hearing improvement. *J Laryngol Otol* 2021: 1-3.

**Figure legend:**

The figures depicted Mr. A's pure tone audiometry on April 18th, May 1st, and May 3rd (Fig 1A); the figures depicted his short increment sensitivity index test (SiSi test) on May 1st (the worst day) and May 3rd (symptoms subsided) (Fig 1B).





**Figure legend**  
 The figures depicted Mr. A's pure tone audiometry on April 18th, May 1st, and May 3rd (Fig 1A); the figures depicted his short increment sensitivity index test (SISI test) on May 1st (the worst day) and May 3rd (symptoms subsided) (Fig 1B)

Figure 1

27x15mm (600 x 600 DPI)