Neuropuncture, an Effective Treatment Method for Patients with Subjective Tinnitus Accompanied with Hearing Loss: Case Reports

Helen K. Law, PhD, DAc, LAc,i and Michael D. Corradino, MSTOM, DAOM, AP

ABSTRACT

Background: Tinnitus is a serious health condition. It can be debilitating and as such negatively affects a patient’s quality of life. People with tinnitus often experience distress, depression, anxiety, frequent mood swings, sleep disturbances, irritability, frustration, poor concentration, and possible suicidal thoughts or actions.

Objective: The goal of this article is to introduce an acupuncture system, based on neurophysiology and termed Neuropuncture, as a possible effective treatment method for tinnitus accompanied with and/or secondary to hearing loss. The treatment protocol works by targeting the greater auricular nerve, trigeminal nerve, cervical plexus, and auditory cortex to neuromodulate, neurorehabilitate, and neuroregulate the nervous system and repair the nerve damage.

Design: Three case studies are presented herein as examples. They are based on neurophysiologic mechanism of tinnitus and hearing loss, treatment principle, treatment methods, and subjective and clinically objective tests. Electroacupuncture protocols used various frequencies with microcurrent and millicurrent stimulation.

Conclusions: Neuropuncture system is an effective treatment for patients with acute and chronic subjective tinnitus and hearing loss. Results showed reduction of tinnitus and partial restoration of hearing loss. Further research and possible large-scale trial studies are suggested.

Keywords: tinnitus, hearing loss, SNHL, acupuncture, electroacupuncture, Neuropuncture

INTRODUCTION

Tinnitus is the perception of sound when there is an absence of actual external noise.1 Approximately 15% of American adults report some trouble of hearing and roughly 10% of the U.S. population, or about 25 million people, struggle with burdensome chronic tinnitus, whereas 2 million suffer from extreme and debilitating cases. It is estimated 90% of tinnitus cases occur with underlying hearing loss.2

Tinnitus is commonly described as ringing in the ears. It can also sound like roaring, hissing, buzzing, whistling, swooshing, ringing, or clicking. It may be soft or loud, and high or low pitched, and can happen in 1 or both ears. It can be the result of a number of health conditions but is not a disease by itself.3 Tinnitus is considered as a pathology that involves synaptic plasticity at the level of the synapses between inner hair cells and the auditory nerve.4 Specifically when sound waves hit the tympanic membrane, the vibration causes the Organ of Corti and its hair cells to generate electrical signals that are then sent to the brain for interpretation. The tympanic membrane is innervated by the auriculotemporal branch of the trigeminal
nerve, the auricular branch of the facial nerve, the auricular branch of the vagus nerve, and the glossopharyngeal nerve.\(^5\)

Sensory innervation to the external ear is supplied by both cranial and spinal nerves. Branches of the trigeminal, facial, and vagus nerves (CN V, VII, X) are the cranial nerve components, while the lesser occipital and greater auricular (C2, C3) nerves are the spinal nerve components involved. The vestibulocochlear nerve, also known as cranial nerve 8 (CN VIII), has distinct nuclei within the brainstem and the cochlear nerve is responsible for hearing.\(^6\)

Recent studies have shown that acupuncture could regulate inflammatory response,\(^7\) and enhance the excitability and conductivity of the auditory nerve.\(^8\) Karavis reported how the neurophysiology mechanism of acupuncture activates neural pathways that created multifactorial phenomenon throughout the body.\(^9\) Han concluded that acupuncture or electrical stimulation in specific frequencies applied to certain body sites can facilitate the release of specific neuropeptides in the central nervous system (CNS), which subsequently elicit physiologic effects and activate self-healing mechanisms.\(^{10-14}\) Kim et al.\(^{15}\) in a recent trial study showed that electroacupuncture is more effective than manual acupuncture and TENS (transcutaneous electrical nerve stimulation) for people with chronic tinnitus.

Based on these theories and clinical experience, the authors report herein the use of this acupuncture protocol and preliminary results on patients with acute and chronic tinnitus secondary to hearing loss treatments as a possible effective and clinically reproducible treatment method.

**Intervention**

For tinnitus and hearing loss, the treatment principles are focused on local inflammation; target specific nerves such as the greater auricular nerve, facial nerve, trigeminal nerve, and vagus nerve; target specific neural plexuses that innervate the vestibulocochlear nerve, and also target the CNS specifically the auditory cortex. This acupuncture system utilizes electroacupuncture to neuromodulate the damaged nerves, neuroregulate the neural plexuses, and neurorehabilitate regions of the brain to repair them back to health.

The authors used 7 Neuropuncture points.\(^{16}\) These points are located near regions of the TCM (Traditional Chinese Medicine) points. They are GANP (Greater Auricular Neuropuncture Point) (Fig. 1), SRNP (Superficial Radial Neuropuncture Point) (Fig. 2), TriFNP (Trigeminal/Facial Neuropuncture Point) (Fig. 3), PANP (Posterior Auricular Neuropuncture Point) (Fig. 4) of the affected side, HTJJ (Hua Tuo Jia Ji acupuncture points) C2/C3, and the Neuropuncture Scalp Auditory Cortex (Neuropuncture Scalp Auditory Cortex) (Fig. 5) of both sides, using sterile single-use 0.25-mm-thick 50-mm-long needles (DBC Spring Ten Korean brand); and Pantheon electrostimulator 8c Pro. This device is manufactured by Pantheon Research in the United States and is Food and Drug Administration (FDA)-registered electrical stimulator specifically for electrical acupuncture. It provides a biphasic electrical square waveform with a 400 \(\mu\)s pulse width. It offers both millicurrent and microcurrent options. The frequency generator is
microprocessor calibrated for most accuracy. The Neur-
puncture points were selected according to neuroscience
research and neuroanatomy. The depth and direction of in-
sertion of the needle differed depending on the location of
the Neuropuncture points. These acupuncture needles were
applied until the patient experienced the classical De Qi
sensation and then connected to electrical leads.

The main Neuropuncture prescription for tinnitus is to
connect the lead with electrical clamps to GANP and SRNP,
and another lead to TriFNP to PANP on the affected side.
The Neuropuncture Electrical Dosage is 25 Hz micro-
current. In an alternate modified Neuropuncture prescription
for tinnitus the third lead is connected from HTJJ C2 and C3
to the Neuropuncture Scalp Auditory Cortex region bilat-
erally. See Table 1 for details. The Neuropuncture Electrical
Dosage is 2 Hz millicurrent for 30 minutes. Neuropuncture
therapy was suggested for twice per week. The Subjective
Units of Distress (SUD) scale used in the following case
studies describes the approximate level of hearing distur-
ance and discomfort subjectively from the annoying noise
in the ears that cause irritability, insomnia, and stress. Henry
et al. concluded neither the loudness nor other psycho-
acoustic measures of tinnitus had a consistent relationship to
the severity of this condition, hence there was no standard
protocol for tinnitus evaluation.

**CASE STUDIES**

Table 2 is a summary of the records of 14 patients,
collected in the past 2 years. Three of these cases are de-
scribed in detail in the following as examples for specific
illustration.

**Case 1: Tinnitus and Hearing Loss as a Result
from Severe Sinus and Ear Congestion**

A 57-year-old woman came to the office on June 19, 2019
seeking relief from her tinnitus and hearing loss. Her vital
signs, including blood pressure and pulse rates, were within
normal limits. Her current medical history included severe
sinusitis, insomnia, fatigue, and stress.

One year ago, patient started to feel fullness in her left ear
and experienced a high pitch ringing and vertigo. She felt
very congested in her frontal sinuses and both ears, with the
left ear being worse. She then developed a very loud high-
pitch noise with hearing loss in her left ear at an SUD scale
of 8/10. The noise interrupted her sleep at night. Patient
got to her ear, nose, and throat (ENT) doctor, an audio-
gram was performed and showed significant hearing loss in
her left ear, registering 40 dB within the range of 250 to
4,000 Hz, with rapid reduction beyond it.

A main Neuropuncture tinnitus prescription was per-
formed at the first treatment. Patient reported that hearing
began to return slowly afterward. After 3 treatments, she
reported that she was able to hear a different “layer” of
sound (she is a musician) and began to enjoy listening to
music again. A total 12 treatments twice a week, including
Tinnitus Main and Modified Protocols, were conducted.
Patient reported having tremendous “draining” from her
ears and the ringing changed from high pitch to a different

![FIG. 5. Auditory cortex-scalp acupuncture auditory and dizzy line.](image-url)
lower tone with much less intensity with an SUD scale of 4/10. Her relationship with her husband improved because she did not have to constantly ask him to repeat himself in conversation.

The patient saw her ENT doctor for her 1 year follow-up in June, 2020. The result of the audiology test showed a significant improvement in hearing of her left ear. She was able to hear low frequency at 250 Hz clearly and high frequencies ranging from 4,000 to 6,000 Hz at 15 dB. Eighteen months follow-up in the office showed the tinnitus was occasionally noticeable; her SUD scale was at 1/10 and her hearing in July 2020. The result of the audiology test showed a significant improvement in hearing of her left ear. She was able to hear low frequency at 250 Hz clearly and high frequencies ranging from 4,000 to 6,000 Hz at 15 dB. Eighteen months follow-up in the office showed the tinnitus was occasionally noticeable; her SUD scale was at 1/10 and her hearing in July 2020.

**Case 2: Tinnitus and Hearing Loss Postcraniectomy**

A 54-year-old woman came to the office on July 21, 2020 reporting that she had completely lost hearing in the left ear. Her vital signs, including blood pressure and pulse rate, were within normal limits. Her current medical history includes loss of hearing in the left ear, tinnitus with low-pitch roaring noise at an SUD scale of 6/10, insomnia, headaches, blurry vision with nystagmus, severe sinus congestion, neck pain, and hot flashes.

The loss of hearing happened immediately after her fourth craniectomy for resection of posterior fossa recurrent ependymoma located in the left lateral recess of the fourth ventricle. She was diagnosed with unilateral sensorineural hearing loss (SNHL).

Before the first Neuropuncture treatment, a quick rudimentary test was conducted to check the ability of hearing by clicking the fingernails outside the left ear. Patient reported not being able to hear anything. Neuropuncture tinnitus main protocol was used at the first session. After completing the treatment, again using the same finger clicking test, the patient reported that she was able to regain some hearing. The sinus congestion was much reduced after the second treatment. After the third treatment, she was able to hear conversation if spoken close to the left ear. Patient reported that the low-pitch roaring noises had significantly reduced to an SUD scale of 2/10. She also reported that she was able to hear partial conversations between family members and sometimes understood news reporting on the television.

An audiogram test was performed on August 21, 2020 after 9 treatments and that included Tinnitus Main and Modified Protocols. Patient showed improvement of her left ear that she could hear from 500 to 2,000 Hz at 20 dB. She still showed poor hearing for the low- and high-pitch sound, but this was certainly better than the complete loss of hearing in July 2020.

**Case 3: Tinnitus and Ear Congestion due to Hole in Ear Drum**

A 52-year-old man came to the office on July 2, 2020 complaining of tinnitus and fullness in his right ear. His vital signs, including blood pressure and pulse rate, were within normal limits. Patient’s current medical history includes right ear tinnitus, loss of hearing, with a fullness sensation.

He reported feeling fluid in his right ear back in 2004, and his ENT doctor implanted an ear tube to help drain the fluid. This ear tube was removed in 2012. Patient started having tinnitus in 2016. He visited his ENT doctor who found a hole in the ear drum in 2018. Patient continued feeling the fullness in his right ear with high pitch ringing sound at an SUD scale of 6/10. In June 2020, the ENT doctor suggested inserting another ear tube and prescribed steroid medicine. However, patient decided to pursue the acupuncture route.

After the first Neuropuncture tinnitus prescription treatment, patient reported feeling immediate relief, with the right ear fullness reduced, and the intensity of the high pitch dropped 2 U in the SUD scale from 6/10 to 4/10. The Neuropuncture treatment plan was 6 weeks for a total of 12 treatments that included Tinnitus Main and Modified protocols. At the end of the treatment plan on September 24, 2020 the patient reported that the tinnitus was noticeable reduced to an SUD scale of 1/10, and he only experienced slight “sloshing/flapping” sound once or twice a day.
| Gender | Age | Symptoms                                                                 | Date of service | Treatment protocol(s)                                                                 | Frequency of visits | Follow-up results                                                                                                                                 |
|--------|-----|---------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 Male | 28  | Acute severe tinnitus, military personnel after shooting practice         | April 2018      | Tinnitus main                                                                          | 2 times a week for 1 week | Tinnitus completely stopped after 2 treatments. No follow-up.                                                                                       |
| 2 Male | 54  | Tinnitus, left ear acoustic neuroma; facial droop; treated with proton beam radiation | November 2018   | Tinnitus main; add treatment for facial paralysis                                      | 3 times a week for 3 weeks | Two years follow-up tinnitus was 60% reduced, facial droop 90% improved, result stayed the same since treatment                                        |
| 3 Male | 71  | Chronic tinnitus                                                          | April 2019      | Tinnitus main                                                                          | Once a week for 4 weeks | One year follow-up tinnitus happened only occasionally                                                                                              |
| 4 Female | 59 | Tinnitus, severe sinusitis, loss of hearing                               | June 2019       | Tinnitus main alternate with tinnitus modified                                          | Once a week for 12 weeks | One year follow-up tinnitus was gone, hearing improved 90%, sinus congestion was gone                                                                 |
| 5 Female | 67 | Tinnitus, chronic allergic rhinitis and ear congestion                    | June 2019       | Tinnitus main                                                                          | Once a week for 12 weeks, then once a week for 3 months and once a month maintenance            | Tinnitus was mostly not noticeable, postnasal drip continued, and ear congestion reduced                                                                 |
| 6 Female | 81 | Pulsatile tinnitus                                                        | November 2019   | Tinnitus main                                                                          | 2 times a week for 3 weeks | One year follow-up tinnitus was 90% improved                                                                                                         |
| 7 Female | 58 | Acute tinnitus                                                            | January 2020    | Tinnitus main                                                                          | 2 times a week for 4 weeks | One year follow-up tinnitus was gone                                                                                                                   |
| 8 Male | 44  | Tinnitus for 4 years, vertigo, neck pain, loss of balance                | January 2020    | Tinnitus main                                                                          | Once a week for 5 weeks | One year follow-up showed tinnitus occurred occasionally, vertigo was gone, balance improved                                                                 |
| 9 Female | 49 | Tinnitus, C6/7 herniation, neck pain                                      | February 2020   | Tinnitus main                                                                          | Once a week for 3 weeks | Tinnitus was gone after 3 weeks. One year follow-up showed the result remained the same                                                                 |
| 10 Female | 47 | Tinnitus, hearing loss; bartender worked in a very noisy loud place      | February 2020   | Tinnitus main alternate with tinnitus modified                                           | Once a week for 5 weeks | Tinnitus and hearing loss recovered after treatment and lasted for 4 more months. However, tinnitus returned without continued treatment               |
| 11 Female | 54 | Tinnitus, complete loss of hearing post fourth craniectomy                | July 2020       | Tinnitus main alternate with tinnitus modified                                          | Two times a week for 6 weeks, then once a week for maintenance | 6 months follow-up, tinnitus is gone, hearing continued improving                                                                                   |
| 12 Male | 56  | Tinnitus, fullness in the right ear, hole in right ear drum               | July 2020       | Tinnitus main                                                                          | 2 times a week for 4 weeks, then once a week for 4 weeks | 6 months follow-up, fullness in the right ear completely gone, tinnitus was improved 90%                                                                 |
| 13 Male | 71  | Tinnitus, hearing loss, dizziness after an intense workout routine       | October 2020    | Tinnitus main alternate with tinnitus modified                                           | Too times a week for 2 weeks | Tinnitus, dizziness, hearing loss completely recovered. 3 months follow-up results remained same.                                                   |
| 14 Female | 50 | Tinnitus, ear congestion after fighting a flu episode                     | January 2021    | Tinnitus main                                                                          | Once a week for 4 weeks | Follow-up tinnitus reduced 80%, congestion was 90% improved                                                                                           |
DISCUSSION

Neuropuncture therapy based on neuroscience and neurophysiology target the damaged nerves by stimulating the neural plexus, spinal nerves, and the auditory cortex in the CNS to neurorehabilitate, neuromodulate, and neueregulate the ear back to health. The 3 case reports discussed earlier show acute and chronic subjective tinnitus and/or hearing loss with very different complaints and causes. The first case patient suffered long-term severe sinusitis, the second case patient suffered hearing loss and tinnitus postcraniectomy, and the third case patient had fullness in the ear with a puncture to the eardrum. Additional cases presented in Table 2 also bring up the complexity and persistence of the causes such as the environment being a constant stimulant, for example, the bartender working in a noisy and loud workplace. The resilience in maintaining the treatment also reduced with age. All these special situations would require adherence to periodic maintenance programs.

CONCLUSION

Tinnitus can negatively affect the quality of life. Hearing loss is a major public health issue. Goman et al. estimated that during the next 43 years, the number of people with hearing loss in the United States is projected to almost double. Unfortunately, there are no drugs or effective therapies to benefit those people who are suffering. Based on the 3 representative case reports discussed in detail, together with additional cases in Table 2, the main Neuropuncture tinnitus prescription and its modification are an effective treatment to help patients who suffer from acute or chronic subjective tinnitus and/or secondary to hearing loss are demonstrated. The authors are encouraged that these results offer promising potential for short- and long-terms benefits and suggest serious consideration by the medical community to conduct large-scale trial studies for further exploration.

ACKNOWLEDGMENT

The authors thank Ana Gancheva for designing the graphics.

AUTHOR DISCLOSURE STATEMENT

Dr. M.D.C. combined many years of research and extensive clinical experiences to create the Neuropuncture acupuncture system, which was adopted in the case studies reported herein. This system is based on neuroscience and neurophysiology principles and by using this treatment technique, it has shown the effect of neuromodulate, neueregulate, and neurorehabilitate patients health back into homeostasis and return back to health.

FUNDING INFORMATION

No external funding was received during the course of this study, including preparation of this article.

REFERENCES

1. Bhatt JM, Lin HW, Bhattacharyya N. Prevalence, severity, exposures, and treatment patterns of Tinnitus in the United States. JAMA Otolaryngol Head Neck Surg. 2016;142(10):959–965.
2. National Institute on Deafness and Other Communication Disorders (NIDCD) [internet]. NIDCD staff. [updated December 15A, 2016, cited October 13, 2020]. Quick Statistics About Hearing. Online document at: www.midcd.nih.gov/health/statistics/ Accessed August 9, 2020.
3. National Institute on Deafness and Other Communication Disorders (NIDCD) [internet]. NIDCD staff. [updated March 6, 2017, cited August 9, 2020]. Tinnitus. Online document at: http://midcd.nih.gov/health/tinnitus/ Accessed August 9, 2020.
4. Henry JA, Roberts LE, Caspary DM, Theodoroff SM, Salvi RJ. Underlying mechanisms of Tinnitus: Review and clinical implications. J Am Acad Audiol. 2014;25(1):5–126.
5. MSK Neurology [internet]. Kjetil Larsen. [updated December 28, 2017, cited August 6, 2020]. Tympanic and Ossicular Innervation. Online document at: http://mskneurology.com/association/tinnitus-neck/ Accessed August 6, 2020.
6. White HJ, Helwany M, Peterson DC. Anatomy, head and neck, ear organ of corti. In StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2020:30855919.
7. Fan XH, Ding YN, Chang XH, Ouyang YL, Xie Q. Comparative observation on acupuncture-moxibustion and western medication for treatment of sudden deafness. Zhongguo Zhen Jiu. 2010;30:630–632.
8. Ying HZ, Yan QF. Effects of acupuncture combined hyperbaric oxygen in treatment of sudden deafness on blood rheology and clinical efficacy. China Modern Doct. 2014;52:13–16.
9. Karavis M. The neurophysiology of acupuncture: A viewpoint. Acupunct Med. 1997;15(1):33–42.
10. Han, JS. Acupuncture: Neuropeptide release produce by electrical stimulation of different frequencies. Trends Neurosci. 2003;26(1):17–22.
11. Han JS, Terenius L. Neurochemical basis of acupuncture analgesia. Ann Rev Pharmacol Toxicol. 1982;22:193–220.
12. Ulett G, Han S, Han JS. Electroacupuncture: Mechanisms and clinical application. Biol Psychiatry. 1998;44(2):129–138. Review.
13. Han JS. Opioid and anti-opioid peptides: A model of Yin-Yang balance in acupuncture mechanisms of pain modulation.
14. Han JS. Acupuncture: Frequency dependent release of neuropeptides in CNS. Trends Neurosci. 2003;26:17–22.
15. Kim BH, Moon YK, Kim MH, Nam HJ. Comparing the effects of manual acupuncture, electroacupuncture and transcutaneous electrical nerve stimulation on chronic tinnitus: A randomized controlled trial. Integr Med Res. 2020;9:1–5.
16. Corradino MD. Neuropuncture: A Clinical Handbook of Neuroscience Acupuncture. 2nd ed. London: Singing Dragon; 2017:82.
17. Henry JA, Meikle MB. Psychoacoustic measures of Tinnitus. J Am Acad Audiol. 2000;11:138–155.
18. Goman AM, Reed NS, Lin FR. Addressing estimated hearing loss in adults in 2060. JAMA Otolaryngol Head Neck Surg. 2017;143(7):733–734.

Address correspondence to:
Helen K. Law, PhD, DAc, LAc
Chinese Acupuncture Healthcare, LLC
611 Executive Drive
Princeton, NJ 08540
USA
E-mail: helenlaw@princetonhealthcare.com