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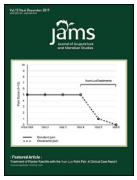

Case Report

# Cervical Trigger Point Acupuncture for Treatment of Somatic Tinnitus

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**Abstract**
Cervicogenic somatic tinnitus is a subtype of subjective tinnitus and is defined as tinnitus in which forceful contractions of jaw and neck muscles modulate its psychoacoustic attributes. Various physical therapies have been proposed for the treatment of somatosensory tinnitus although there is no definitive cure for it. This report describes the use of acupuncture in the treatment of a 71-year-old woman with chronic neck pain who suffered from a left-sided tinnitus for 2 years as well. The tinnitus and neck pain severity was rated as 7 and 6, respectively, on a numeric rating scale of 10. On examination, she had restricted cervical range of motion and several myofascial trigger points in cervical muscles. Audiometric tests of the patient were normal. She received trigger point acupuncture of cervical muscles twice per week for 10 sessions. Her tinnitus completely disappeared after the third session and did not return during the 5-year follow-up. Her neck pain intensity also decreased to 1 on the numeric rating scale after 10 sessions. Based on the results of this study, direct trigger point acupuncture of cervical muscles may be beneficial in the treatment of somatic tinnitus with a long-duration effect.

## 1. Introduction

Tinnitus is a common symptom defined as sound perception in the absence of sound input external to the patient. Tinnitus is a symptom of an underlying condition, such as age-related hearing loss, ear injury, or a circulatory system disorder. The prevalence of tinnitus has reported to be 20.7—24.2% in the general population [1,2].

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The prevalence of tinnitus and the rates of annoying tinnitus increase with age and also are associated with some factors such as gender, history of smoking, and hearing loss [1].

There are two kinds of tinnitus, subjective and objective. Objective tinnitus accounts for less than 1% of cases [3] and involves the perception of an internal sound such as a bruit [4].

Subjective tinnitus is the most common type and is audible only to the patient [3]. It can be caused by problems in the outer, middle, or inner ear. It can also be caused by problems with the auditory nerves or the part of the brain that interprets nerve signals as sound. Subjective tinnitus is classified as otologic, toxicologic, somatic (temporomandibular joint dysfunction, head or neck injury), traumatic, neurologic, infectious, and metabolic [5].

Cervicogenic somatic tinnitus (CST) is related to the somatosensory system of the cervical spine [6]. The prevalence of CST is unknown, but in a highly selected group of patients with chronic tinnitus, as many as 43% of patients had CST [7]. It is associated with activation of the somatosensory, somatomotor, and visual motor systems. Although it seems common, its pathophysiology, assessment, and treatment are not well defined [8]. The loudness or intensity of this type of tinnitus can be changed by sensory or motor stimuli such as muscle contractions, mechanical pressure on myofascial trigger points, transcutaneous electrical stimulation, or joint movements [9]. Prevalence of neck dysfunction in patients with CST is more than that in patients suffering from other forms of chronic subjective tinnitus [7].

Various physical treatments have been used for somatosensory cervicogenic tinnitus.

Cervical physical therapies such as exercise, transcutaneous electrical nerve stimulation, manipulations of the cervical spine and trigger point deactivation by ischemic compression, and steroid and lidocaine injection have been used in previous studies and may have a potential effect in treatments of somatic tinnitus [6,10-13].

In a single case with chronic subjective tinnitus that lasted 20 years, the condition completely disappeared within 4 weeks of an intermittent short-time application of the cervical collar [14].

Mechanical treatments of the cervical spine and jaw focused on normalizing cervical spine mobility through repetitive movements, joint mobilization, and soft tissue massage have been shown to be effective on improving somatosensory tinnitus on a 42-year-old man [15].

Some previous studies demonstrated the beneficial effect of traditional Chinese acupuncture and electroacupuncture in the treatment of different types of subjective tinnitus [16-18]. A recent trial did not find more benefits of scalp and periauricular electroacupuncture in the treatment of somatic tinnitus compared with nonsomatic tinnitus [19].

At present, there is a lack of studies that examine the effect of either traditional Chinese or Western acupuncture in treatment of CST. Here, we report a patient with a 2-year history of somatosensory tinnitus who was effectively treated by trigger point acupuncture of cervical muscles with a 5-year follow-up.

## 2. Case presentation

A 71-year-old woman was referred from the hearing clinic to physical medicine and rehabilitation clinic with a complaint of continuous left-sided tinnitus for two years. She described her tinnitus as a "ringing" sound. She also suffered from nonradicular neck pain since about 20 years ago, which had worsened progressively over the past 2 years. Her neck pain and tinnitus was more intense toward the end of the day. The tinnitus and neck pain severity was rated as 7 and 6, respectively, on a numeric rating scale (NRS) of 10. She had not been able to sleep on her left side for 2 recent years owing to pain and significant limitation in cervical left bending and rotation. She denied any upper extremity symptoms, hearing loss, vertigo, headache, or temporomandibular joint disorder. She suffered from blood hypertension disease since 15 years. Her hypertension was controlled by metoprolol. She took the nonsteroid antiinflammatory drug when her neck pain was worse and regularly for the previous two weeks. She reported that her pain decreased to some degree by taking nonsteroid antiinflammatory drugs, but they were not effective on her tinnitus.

Palpation of the neck revealed localized tenderness of the C3 to C7 joint, more severe in the left side, and several myofascial trigger points within the left and also the right upper trapezius muscles. Cervical spine range of motion (ROM) was restricted in extension and notably in left rotation and bending. Examination did not find any tenderness or movement asymmetry in the temporomandibular joint. Upper extremity neurologic examinations were unremarkable for motor, reflex, and sensory testing. Cranial nerve and cerebellar examination was normal [20].

Her pure tone audiometry, speech recognition test, and tympanograms ordered by an otolaryngologist yielded normal results. She also had a normal brain magnetic resonance imaging scan. Cervical spine radiographs revealed mild to moderate discogenic spondylosis at C4 to C7.

Based on her signs, symptoms, and diagnostic tests, she was diagnosed with chronic cervical spondylosis. She received trigger point acupuncture twice per week in trigger points of the bilateral upper trapezius and cervical muscles including the splenius capitis, semispinalis capitis, sternocleidomastoid, levator scapula, and suboccipitals (Fig. 1).

Dong Bang disposable stainless steel needles (0.25 mm × 40 mm) were inserted into the skin over the trigger point and then to a depth of 15—20 mm into the muscle. The "sparrow pecking" technique was used to elicit a local muscle twitch response. The needle was then left for a further 15—20 minutes.

The NRS score of her tinnitus decreased to 4 after the first session of acupuncture and 0 after the third session. The acupuncture treatment continued to Session 10 when she rated her neck pain intensity 1 on the NRS in 2 consecutive sessions. She also demonstrated significant objective improvements in the cervical ROM.

In addition, she received education about neck and shoulder exercises (stretching and also strengthening) to perform regularly at home. She presented to our clinic two

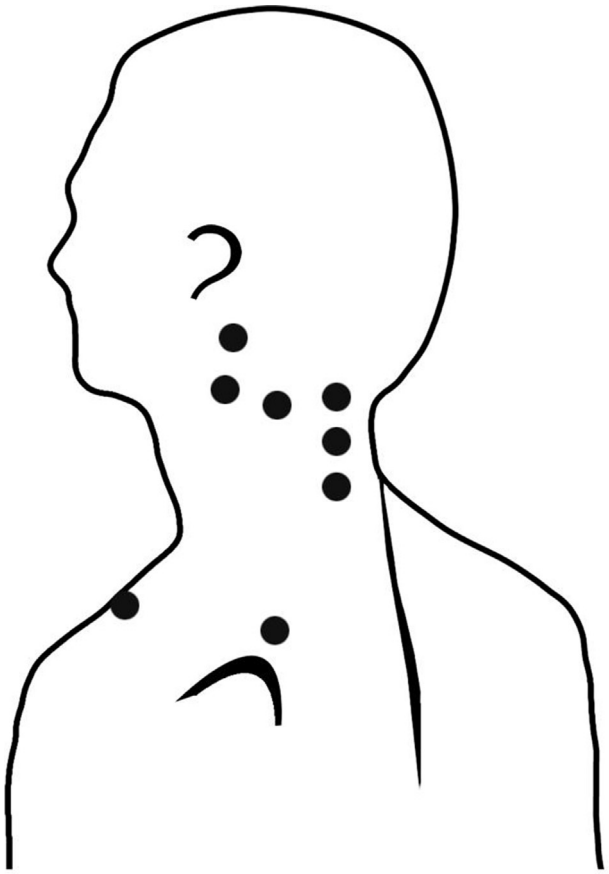

**Figure 1** Location of trigger point acupuncture. The points were located in the bilateral upper trapezius and cervical muscles including the splenius capitis, semispinalis capitis, sternocleidomastoid, levator scapula, and suboccipitals.

times for treatment of mild neck pain without experiencing tinnitus in the 5-year follow-up.

## 3. Discussion

This case report describes a patient diagnosed with cervical spondylosis who was treated with 10 sessions of trigger point acupuncture in cervical muscles.

Besides improvement of neck pain and ROM, the tinnitus of our patient was hypothesized to have been caused by cervical dysfunction which disappeared after 3 sessions of treatment.

A wide range of treatments including drugs, physical modalities, manual treatments, and exercise are used inTreatment of chronic neck pain. Previous studies have also shown the benefit of trigger point acupuncture in the cervical muscles for the treatment of neck pain caused by cervical spondylosis [21-22].

Somatic tinnitus is defined as tinnitus in which forceful contractions of jaw and neck muscles modulate its psychoacoustic attributes [19].

Similar to chronic neck pain treatments, various physical therapies have been proposed for the treatment of somatosensory tinnitus although there is no definitive cure for it. There are positive effects of cervical manual mobilization, exercise therapy, trigger point deactivation, and also the cervical collar on tinnitus severity regarding cervical spine treatment [9-14,23].

A physiological explanation for the effect of neck and jaw treatment on tinnitus is the connection between the somatosensory system of the cervical spine and temporomandibular joint with the central auditory system and more specifically with dorsal cochlear nuclei by afferent fibers. This makes the somatosensory system able to influence the auditory system by altering the spontaneous rates or synchrony of firing of neurons and leads to changes in the intensity and the character of the tinnitus [24-25].

Although the efficacy of traditional Chinese acupuncture and electroacupuncture has been shown in patients with tinnitus by some studies [16-18], studies regarding efficacy of acupuncture on somatic tinnitus are lacking.

It is believed that somatically induced tinnitus is a subgroup responsive to somatosensory-based treatments including acupuncture. However, one prospective study that compared the effect of acupuncture on 2 groups of patients with somatic or nonsomatic tinnitus did not find higher efficacy of scalp and periauricular electroacupuncture in either group [19].

Laser therapy, pressure release, transcutaneous electrical nerve stimulation, acupuncture, and manipulation are scientifically supported treatments for myofascial trigger point relief [26].

Trigger point deactivation by ischemic compression and also injection of steroid and lidocaine have been administrated in the treatment of somatic tinnitus [12-13]. Wyant [13] described two patients, one with tinnitus and occipital headache and the other with tinnitus and cervical pain. In both patients, tinnitus and pain were relieved after injections of steroid and lidocaine into trigger points of the cervical region. A double-blind placebo-controlled randomized clinical trial on 71 patients with tinnitus and myofascial pain syndrome showed a significant decrease in tinnitus and pain intensity from trigger point deactivation of cervical muscles by 10 sessions of digital pressure release [12].

There is difference between the acupuncture approaches in treatment of myofascial trigger points: indirect needling approach whereby the myofascial trigger points themselves were not needled (superficially at a subcutaneous level or the site of classic acupuncture) and direct needling approach (inserting needles and leaving them in situ for a while or sparrow pecking technique) [27].

Data regarding diagnosis and treatments of somatic tinnitus are scarce. The preliminary findings have shown positive effects of different physical therapy approaches focusing on the neck and jaw musculature and bone. To the best of our knowledge, the benefit of direct trigger point acupuncture of cervical muscles on somatic tinnitus with a long-duration effect was shown in the present case for the first time. However, this finding needs to be assessed by further large clinical trials.

## 4. Conclusion

Somatosensory tinnitus is a cause of subjective tinnitus that should be taken into account in patients with signs and symptoms of cervical spondylosis, especially those with

normal audiometric tests. Furthermore, acupuncture in trigger points of cervical muscles may be an effective treatment.

## Disclosure statement

The authors declare no conflict of interest.

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