

Improving Tinnitus with Mechanical Treatment of the Cervical Spine and Jaw

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This article describes a case report of a 42-year-old male auto mechanic experiencing intermittent bilateral tinnitus, headaches, blurred vision, and neck tightness. He described his tinnitus as a "buzzing." He also suffered from neck pain, headaches, dizziness, and blurred vision. His occupation as a mechanic required maintenance of prolonged positions of head protrusion and neck flexion while working.

Examination found reductions in cervical ranges of motion: extension, bilateral rotation, and lateral flexion.

Asymmetry was noted in his temporomandibular joint (TMJ) movements.

Resisted muscle contractions of the cervical spine in flexion, extension, and rotation increased his tinnitus.

His treatment focused on normalizing cervical spine mobility through repetitive movements, joint mobilization, and soft tissue massage.

At 10 weeks, the patient demonstrated a complete reversal of his tinnitus after 10 physical therapy sessions.

"This case reflected treatment targeted at cervical and TMJ impairments and notable improvements to tinnitus."

KEY POINTS FROM THIS ARTICLE:

- 1) Subjective tinnitus is described as the perception of sound in the absence of an external sound source.
- 2) Tinnitus affects 30-50 million Americans. About 16 million Americans experience a severe form of tinnitus that impacts the quality of life.
- 3) About 15% of the world population has tinnitus.
- 4) "Musculature and joint pathologies of the head and neck are frequently associated with tinnitus."

- 5) Causes of tinnitus include:
- Inner ear injury or disease
 - Aging
 - Head trauma
 - Neck muscle dysfunction **[Important]**
 - Surgical injury
 - Smoking
 - Arthritis
 - Chemotherapy
 - Idiopathic with no known cause
- 6) Tinnitus is often associated with other aural symptoms such as hearing loss and hyperacusis.
- 7) People with tinnitus often have disorders of head and neck musculature, including increased muscle tension, neck pain, chronic head/neck spasms, and restricted cervical ranges of motion.
- 8) Tinnitus may also occur concomitantly with two primary biomechanical problems:
- Temporomandibular disorder (TMD)
 - Whiplash disorders
- 9) Somatic tinnitus is tinnitus perception that is enhanced by contractions of head and neck muscles. This suggests that this type of tinnitus “may involve disruptions of complex interactions between auditory and somatic systems.”
- 10) Tinnitus is associated with hyperactivity in the dorsal cochlear nucleus.
- 11) Somatosensory and auditory interactions occur in the dorsal cochlear nucleus. Here auditory neurons receive direct input not only from the auditory nerve but also from the cuneate nucleus, whose inputs include the cervical nerve, which innervates the muscles of the neck and from the trigeminal nucleus, whose inputs come from nerves innervating the muscles of the face and jaw. **[Important, see picture]**
- 12) “Abnormal somatosensory feedback from muscle spindles or golgi tendon organs within tense/tender head, jaw, and neck muscles may release auditory neurons in the dorsal cochlear nucleus from inhibition; the loss of inhibition may, in turn, trigger induction of hyperactivity that leads to the generation of tinnitus.”
- 13) “There are strong indications that a connection exists between tinnitus, neck pain, and jaw disorders.”
- 14) “Physical therapy—oriented treatment, involving care of the temporomandibular joint (TMJ), has also been reported to be of benefit to patients with tinnitus.” Other approaches that have been proven beneficial for tinnitus symptoms include:

- Acupuncture
- "Resolving vertebral subluxations"
- Surgical stabilization of the cervical spine

15) "Abnormalities of the cervical spine, specifically the upper cervical spine mobility and the cervical spine musculature, might be somatic factors contributing to this patient's tinnitus. There was also suspicion that the jaw might be a secondary contributor."

16) Treatment Intervention:

- Reduce the forward head posture
- Improve the upper cervical mobility
- Reduce the contractibility of the cervical musculature
- Educate the patient on the role of head positioning on propagating symptoms

17) Home treatment included repeated posture-improving movements and augmented self-mobilizations techniques to "correct the limitation of his upper cervical rotation (C1-C2)."

- At work, the patient was instructed to take frequent breaks and complete cervical retraction to undo these aggravating 'static postures' and therefore minimize the adverse effects on his cervical spine.

- "To address the abnormal jaw mechanics, the patient was taught to place his tongue on the roof of his mouth behind his front teeth and keep it in this location while opening and closing his mouth, that is, controlled opening of the jaw. During this activity the patient palpated the temporomandibular joints for normal joint translation, and he used the mirror for visual observation of proper technique."

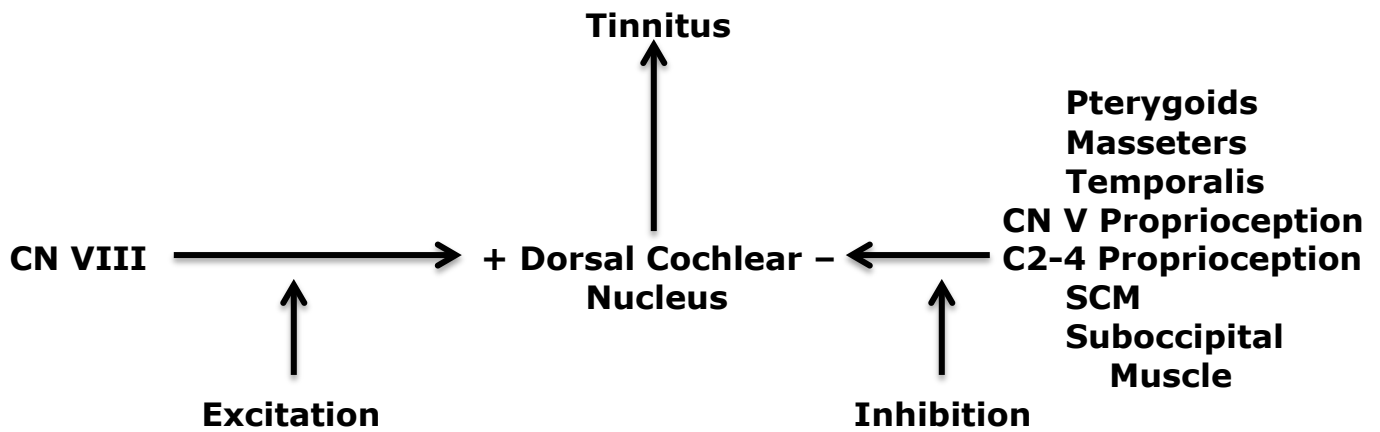
18) Clinic treatment included included soft tissue massage to tight/spasm muscles: on the suboccipital muscles, sternocleidomastoids, upper trapezius muscles, and temporalis, and intraorally on the masseters and the pterygoid region.

19) The patient was seen for a total of 10 visits over a period of 10 weeks. At that time, there was a complete resolution of tinnitus symptoms, neck pain, and dizziness, and solid improvements in posture, range of motion, and muscle tone/tension.

20) "Some tinnitus may have a cervicogenic etiology and that when this is the case, PT designed to correct the neck muscle weaknesses or imbalances may bring a significant degree of benefit."

21) "The ability to modulate tinnitus in human subjects by manipulations of head and neck muscles has been well described and is referred to as somatic tinnitus."

22) "Tinnitus is commonly associated with temporomandibular disorders and upper cervical dysfunction associated with whiplash disorder."



- Somatosensory input converges with auditory nerve input (CN VIII) at the dorsal cochlear nucleus.
- Afferent somatosensory input from the neck muscles enter the spinal cord mainly through the dorsal cervical rami of C2-C4.
- "One specific cervical pathway involves the sternocleidomastoid [SCM] muscle from which sensory information is carried to the spinal cord by the second cervical ramus (C2)."

23) Disruption or loss of normal input from C2 associated with neck disability may result in loss of inhibitory interneurons, resulting in disinhibition and the emergence of tinnitus-producing hyperactivity.

24) "Therapy designed to restore balance of muscle tonicity in the neck could restore normal activity in C2, thereby reversing the disinhibitory process; this reversal of disinhibition may then abolish tinnitus by restoring normal levels of activity in fusiform cells."

25) There is a strong association of muscular trigger points with the incidence of tinnitus in patients with cervical myofascial pain syndrome.

26) "Tinnitus can also be modulated by stimulation of C2."

27) "Cranio-cervical posture defects have been coupled with TMD and myofascial pain to the neck and jaw muscles, and treatment targeted to the TMJ has been shown to reduce complaints of cervicogenic headache."

28) C1-C2 is a commonly implicated segment for cervicogenic headache.

29) A tinnitus treatment approach targeting the upper cervical spine, cervical muscles, and TMJ can reduce or abolish tinnitus perception in some patients.

COMMENTS FROM DAN MURPHY: This is another study showing the neurological inhibitory benefits of improved upper cervical biomechanical function.