

# Archives of Clinical Case Reports

## Case Report

# Tinnitus Relief after Single Session of Osteopathic Cranial Manipulative Medicine: A Case Report

Carolina Fantinel Veloso<sup>1\*</sup>, Michele Vargas Garcia<sup>1</sup>, Rubia Soares Bruno<sup>1</sup>, Sheila Jacques Oppitz<sup>1</sup>, Tainá Betti<sup>1</sup>, Thais Doeler Algarve<sup>2</sup>, Caio Alexandre Parra Romeiro<sup>3</sup>, Aron Ferreira da Silveira<sup>1</sup>

<sup>1</sup>Postgraduate program of Human Communication Disorders, Federal University of Santa Maria, Rio Grande do Sul, Brazil

<sup>2</sup>Postgraduate program of Toxicological Biochemistry, Federal University of Santa Maria, Rio Grande do Sul, Brazil

<sup>3</sup>Morgana Potrich College, Mineiros, Goiás, Brazil

\*Address for Correspondence: Carolina Fantinel Veloso, Rua Felipe de Oliveira, 44 apto 401, Centro, Santa Maria, RS, 97015-250, Brasil, Tel: (+55) (55) 99135.1218; E-mail: caroveloso\_fisio@yahoo.com.br

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### Abstract

Somatosensory causes may trigger tinnitus in normal hearing subjects. This study describes a single session of Cranial Osteopathy (CO) in a 58-year-old woman, normal hearing, complaining of chronic right ear (RE) tinnitus, as well as symptom follow-up and its relapse in six and eighteen months. The symptoms began a year and a half before this report. His medical history included anxiety, cranial pain, and temporomandibular disorder (TMD). The sound resembled a waterfall noise, identified at the frequency of 250 Hz. An attempt was made for previous treatment using occlusal plates for TMD without adherence. The osteopathic dysfunctions were the atlantooccipital joint in extension, compression of the sphenobasilar synchondrosis and posterior condyle of the right mandible. The cranial osteopathy session lasted 50 minutes. During the session, there was modulation of perceived sound, and one week later, total relief of tinnitus was reported. The recurrence of the symptom six months later was due to emotional stress, when, again after a session of CO, there was total relief of the symptom. In the last relapse of the follow-up period, eighteen months after the initial assessment, the emotional factors associated with flu were referred to as causal factors. Again after a CO session, there was symptomatic relief of the symptom in the RE. CO can cause partial or total relief of chronic tinnitus in subjects with complaints about somatosensory tinnitus. Especially in cases of emotional stress that may aggravate the TMD. CO is a low cost and risk therapy for tinnitus treatment.

**Keywords:** Audiology, Audiometry, Visual analogic scale, Osteopathic medicine, Tinnitus

## Introduction

Tinnitus is defined as the perception of sound without external stimulation. There are several causal factors, being the main one hearing loss. However, in individuals with normal hearing thresholds, one of the main mechanisms involved is neuromodulation among sensory, motor modalities, neurocognitive and neuro-emotional networks. Subjects with this type of tinnitus, known as somatosensory, benefit most from a multidisciplinary therapeutic approach [1].

Somatosensory tinnitus, headache, orofacial pains, and temporomandibular disorders (TMD) are associated symptoms when you think of the same causal origin: abnormal cranial mechanics. Normal skull functionality depends on a normal biomechanical relationship between skull, neck, jaw, and occlusion. Therefore, Manual Therapies such as Osteopathy are increasingly studied in disorders related to altered cranial biomechanics [2].

Despite this theory, there are few studies related to the theme, especially randomized clinical trials. Cases of tinnitus remission and relief of related symptoms such as vertigo, dizziness, nausea and imbalances have been described after a single session of osteopathic manipulation in subjects with mild conductive hearing loss [3], cerebral concussion [4] and in two other case reports associated with traumatic injury brain, tinnitus remission with five sessions of cranial osteopathy for a follow-up period of one year [5]. A pilot study has shown that osteopathic manipulation can reduce tinnitus symptomatology through the Visual Analog Scale after seven to 13 sessions of 30 to 60 minutes [6].

This case report, in relation to a clinical study, accepted under number 2958905 of the Research Ethics Committee, aims to describe a case of total relief of chronic tinnitus, with about one and a half year of evolution, of gradual perception, intermittent manifestation and somatosensory origin, though with the possibility of a subclinical cochleopathy.

The hypothesis is, in the same specific cases, cranial osteopathy can be a valid therapy. When chronic and recurrent character of causal factors are determined, it is important to observe the symptom.

## Description of case

### Participant

A 58-year-old woman came to the Tinnitus Outpatient Clinic of a University Hospital, in southern Brazil, reporting tinnitus in the right ear (RE) for a year and a half, of gradual onset, perceived daily at night. The symptom began after a family event that triggered emotional stress. He identified the sound as an intermittent waterfall noise that soothed with music and got worse with stress and tiredness. He also reported temporomandibular joint (TMJ) discomfort, with limited mouth opening and right TMJ crackling, and reported attempted dentist-oriented occlusal plaques, without adhesion.

### Evaluation

In the initial evaluation, a Pure-tone Threshold Audiometry was performed, which presented normal hearing thresholds [7] in both ears for frequencies from 250 to 8000Hz, and in the High Frequency Audiometry (HFA) (up to 18kHz) with downward configuration [8]; in Acuphenometry to identify the sound frequency and the intensity of the tinnitus, presented 19 dBNS at the frequency of 250 Hz; Tympanometry showed A curve indicating normal functioning of the middle ear [9], and in Brainstem Evoked Response Audiometry, all waves were present, as well as their latencies within the normality standards [10].

The Tinnitus Handicap Inventory (THI) [11] and a Visual Analogue Scale (VAS) [12] were used to subjectively verify the annoyance which symptom causes on subject. The annoyance caused by tinnitus was grade 4 (VAS) in the initial evaluation and slight degree (THI).

In the osteopathic evaluation, an osteopathic posterior condyle lesion of the right mandible with disc joint dislocations was found, causing limitation and crack in the mouth opening; and in the sphenobasilar joint of the compression type. The atlantooccipital joint was in extension. In the final reevaluation, there was correction of osteopathic lesions.

## Procedures

### Cranial osteopathy (CO)

The osteopathic manual therapy session was performed by an osteopath, lasting 50 minutes, where the masticatory muscles, lateral and medial pterygoid muscles with intraoral maneuvers and the temporal and masseter muscles were approached [15,14]. The manipulated joints were mandible (global techniques, decoaptation, right posterior condyle maneuver), sphenobasilar synchondrosis decompression (intraoral maneuver), and cranial suture

block release techniques (V-spread) [15]. Finally, techniques for temporal bones, or indirect for auditory tube and the technique of pumping cerebrospinal fluid through the 4<sup>th</sup> ventricle (CV4).

### Results

During the CO session, there was tinnitus modulation, in relation to the sound intensity, referred by the participant. One week after the single session, the patient received a zero score on VAS, representing total symptom relief.

The follow-up for eighteen months showed symptom relapses at

**Table S1: Description of symptomatology and auditory function at time zero, six and eighteen months after session of cranial osteopathy in a subject with chronic tinnitus.**

Time	Evaluation	6 months	18 months
Symptom	Rightear	Rightear	Bilateral
Acuphenometry	250Hz - 19dBNS	250Hz - 19dBNS	RE: 3000Hz - 3dBNS LE: 500Hz- 5dBNS
Type	PulsatingWaterfall	PulsatingWaterfall	RE: Pulsating Waterfall LE: Constant whistle
Tympanometry	Curve - A in both ears	Curve-A in both ears	Curve - C in LE Compliance -204
Complaint	Tinnitus 1.5 yearsago	Tinnitus relapse	Tinnitus relapse
Cause	Stress and TMD	Stress	Stress and flu
VAS	4	7	5
THI	Degree 1 (slight)	Degree 1 (slight)	Degree 3 (moderate)
Medical management	1 <sup>st</sup> Session of CO	2 <sup>nd</sup> Session of CO	3 <sup>rd</sup> Session of CO
Results	Total symptom relief VAS 0 THI not applicable	Total symptom relief VAS 0 THI not applicable	Total relief in RE Permanence in LE VAS 3 Compliance -172 THI Grade 1 (slight)

six and eighteen months, from emotional cause at the first relapse and emotional cause associated with flu at the second relapse. The right ear (RE) always demonstrated total symptom relief, while in the left ear (LE) there was only a reduction from 5 to 3 points in VAS.

The results of this follow-up are described in Table 1, which also shows interesting data from the last follow-up relapse at eighteen months when the tympanometry showed C-curve, indicating possible auditory tube dysfunction. After the CO session, the LE pressure obtained by tympanometry was -172, decreasing the negativity of the auditory tube internal pressure.

## Discussion

Somatosensory tinnitus is a symptom produced by several causes and usually without auditory influences. Therefore, the assessment should be individualized, and all possible causal factors reported. In this case, we identified several factors that may have contributed to the onset and relapse of the symptom: TMD, stress and flu.

The TMD is one of the causes of otologic disorders due to hyperactivity in the masticatory muscles, the contraction of the tensor tympani muscle and the tympanic membrane, a fact that results in auditory tube dysfunction generating symptoms such as ear fullness, imbalance and tinnitus [16].

Patients with temporomandibular joint (TMJ) mobility dysfunction or restriction are strongly benefited by therapies such as Chiropractic or Cranial Osteopathy [17]. The techniques performed in this subject with the purpose of treating the osteopathic lesions contributed to the improvement in the functionality of the mandible. The condyle repositioning and the global mandible maneuvers led to a reduction in the tension of the masticatory muscle tone, with consequent enlargement of the mouth opening and reduction of the TMJ articular crackles, and consequently, a reduction in the perception of tinnitus.

An approach to the sphenobasilar joint is very important in the treatment of ear-related dysfunctions because it knows if the sphenoid bone articulates with almost all skull bones and its position interferes with the maximal position, while occipital influences ATM position [2].

The CO, through the “CV4” and “V-spread” maneuvers, increases blood flow and fluid drainage from specific areas of the skull, face and cervical region, improving tissue oxygenation [18].

Complaints of flu, colds, allergies, or upper respiratory tract infections are mainly related to ear tube dysfunction, as the ear tube fails to open during swallowing or yawning, causing a difference in air pressure inside and outside the middle ear, causing tinnitus [19]. In this study, there was the tinnitus onset in the left ear during the flu episode; This manifestation may have occurred due to the accumulation of fluid in the middle ear, not allowing the equalization of the pressures leaving it negative, reducing the sound passage, hence, tinnitus in the left ear would be a compensation for the lack of auditory input.

Temporal bone maneuver or indirect auditory tube maneuver is a treatment of cranial osteopathy that helps to break the vacuum, normalize pressure on both sides of the tympanic membrane and allow to drain fluid [19]. The beneficial effect was verified in this report regarding this maneuver, since after cranial manipulation the pressure became less negative, indicating improvement of auditory input.

All para-auditory causal factors are likely of relapse. Emotional disorders, for example, may be the cause of tinnitus, or even the consequence of the annoyance caused by tinnitus, therefore responsible for maintaining the symptom [20]. For this reason, it is important the follow up with a multiprofessional team.

In this case report, there are normal auditory thresholds, ie, auditory thresholds up to 25 dBHL at frequencies from 250 to 8,000Hz [21] and Brainstem Evoked Response Audiometry indicating functional integrity of the auditory pathways in this portion, ie an intact auditory pathway, which should not be associated with a causal factor for tinnitus.

However, when the High-Frequency Audiometry (HFA) was performed, there was a downward curve configuration, that is, the auditory thresholds become higher as the frequencies increase; A similar result was found in normal hearing subjects from 18 to 58 years in HFA [8].

A study compared normal hearing individuals with and without

chronic tinnitus in HFA and found a significant increase in the subjects' auditory thresholds with the symptom [22]. In this sense, the existence of a possible cochlear "deficit" was confirmed at the base of the cochlea in the subjects even if they have normal auditory thresholds, which is a predictor for possible future alterations, characterizing a subclinical cochleopathy [23].

## Conclusion

The CO is a low cost and risk therapy that has been revealed to be a tool in the treatment of chronic tinnitus, especially somatosensory tinnitus. This case report described the total relief of symptom with just one session, and showed that relapse can happen and deserves follow-up, especially since a subclinical cochleopathy could be appearing, which may, in the long-term, determine a tinnitus with hearing causal factor. Clinical studies are expected to elucidate the mechanisms of action and results of symptomatic relief of CO in the general population.

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